DRIVER'S REPORT—PLYMOUTH FURY

SPORTS CARS ILLUSTRATED

35¢

MAY 1956

TECHNICAL REPORT: The Hottest Jaguar

America's Answer to Europe: The Frick Cadillac Special!

New Fuel Injection Systems For YOUR Next Car

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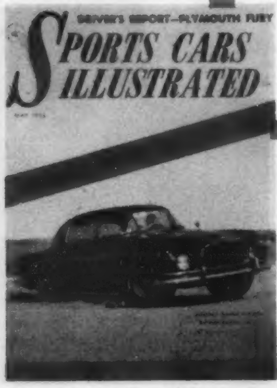

The Frick Special cuts a barreling turn for Danny Rubin who shot this month's cover Ektachrome. The full story of this red hot and somewhat expensive boomer can be found on page 20 .

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CONTENTS

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very sincerely yours:

OUR lead-off piece this month concerns itself with one of Detroit's new "super stock cars," the Plymouth Fury. Perusal of this will indicate that the power race is by no means slackening off. It will also indicate a new trend in Detroit's (or at least Chrysler Corporation's) thinking in this regard. Unlike many of these family boomers built in the past, the Fury *handles*. It isn't just an overpowered passenger car. We have on our desk a letter from a Chrysler engineer who declaims loudly against the reports that the new super-stockers are getting dangerous. He states that all of the hot machinery turned out by his firm are built from the ground up to take the extra power. If the Fury is any indication, the man has a point.

Unfortunately, he can't speak for the entire industry; some of the new factory hop-ups are downright dangerous in inexperienced hands, particularly where automatic transmissions are used in conjunction with all that extra fire. With an automatic gearbox one quite often can't really feel what's happening, a fact which speaks well of the smoothness of the transmission but bodes ill for the life expectancy of an unsuspecting driver. At least one of the factory hot rods can hit 60 mph in 300 feet from a *standing start*. All the sensation of speed one gets is a steady, and strangely gentle, push in the shoulder blades. Without the necessity of shifting gears, there is little indication of the engine speed and the large herd of horses being poured through the driveline unless the driver is really aware of what he is doing.

When coupled with the usual unbalanced weight distribution and soft suspension common in the past on most passenger cars, the above combination can be deadly. Part of the fault lies squarely in the lap of a buying public and part of it lies with the factories for allowing the situation to continue. The public is now conditioned to expect horsepower in huge gobs. Unfortunately they are also accustomed to all the creature comforts. Padding to prevent injury *after* one of these juggernauts has attempted to climb a pole seems infinitely preferable, if the hucksters can be believed, to setting up the automobile in such a way that it doesn't have pole-climbing tendencies. The point driven at here is that the Fury is not uncomfortable by any standards. It *is* a bit firmer than usual and the payoff in security and roadability is amazing for the very small sacrifice in "sofa cushion" softness. At least one of the hop-ups has exhibited a disconcerting tendency to ground-loop on a straight road when the throttle is mashed exuberantly. The Fury, despite a demonstrably faster acceleration rate, shows none of these tendencies. It seems that there is a lesson to be learned here.

• • •

Last month we went on at some length concerning the Corvette. The space was deserved as can be seen from our road test beginning on page 24. Both the acceleration and top speed of a stock Corvette, loaded to the hat with heavyweight extras, are guaranteed to make the Jaguar contingent sit up and take notice. There are very few stock or even M-Jags that can move beyond the 120 mph mark or improve on the acceleration pattern turned in by SCI's têst Corvette, this despite the Chev's curb weight of nearly 3,000 lbs. However, we still feel that unless the Corvette hangs up a record as a sales tool as well as a reputation for being a going bomb, we can't look to Detroit for much more of the same kind of thing. Things are looking up, though; from all early indications the Corvette will be as hot in the salesrooms as it is on the road.

• • •

Coming up for the next issue is a full-bore road test on the 1956 Thunderbird. Ford's personal car is definitely an accelerating fool but how does it stack up with the Corvette in that department and others? We won't give out any secrets but Griff Borgeson will pass on the word in the June SCI. In the same issue, Karl Ludvigsen will take the Ferrari Monza apart for your delectation in the same way he pulled the D-type Jaguar apart in this one. Don't miss it! —*john christy*

letters

renault hop-up

The Editor: SCI

Could you please tell me if there is any equipment on the market for souping up a 1956 Renault engine.

Also do you know how well the Renault stands up against other cars in its class. If so, kindly let me know.

Sincerely,
Bill Gemes,
Rochester, Minnesota

There is no equipment as such for the Renault, but you might try to adapt one of the small superchargers used for the Volkswagen.—Ed.

which car?

The Editor: SCI

I've just read your March issue. I'm a steady reader. Your driver of the month was Mike Hawthorn, an excellent choice. But did he win the Sebring event in a Cunningham or Cunningham's D Jaguar?

Yours sincerely,
William G. LaFontana
Great Barrington, Mass.

The D was the vehicle.—Ed.

momo

The Editor: SCI

March's issue of SPORTS CARS Illustrated is one of the finest I have ever read. Can you tell me where Momo's Garage is?

Philip Chinnici
St. Louis, Missouri

The address of the Momo Corp. is 33-49 59th Street, Woodside 77, New York.—Ed.

trophy taker

The Editor: SCI

I have been buying your magazine for over a year now and find it the best one on the newsstands. It covers all cars and events very well. I think you should do more for the American enthusiasts. My dad has been building some fiberglass body sports cars in the past years and recently finished a competition model. I am enclosing a picture to show you a few of the trophies he won last year. I think he deserves an article in your magazine as he has spent a lot of time and money building a true American sports car.

Sincerely,
William L. Mays
Bloomington, Illinois

THAT letter

The Editor: SCI

Your publication is a very controversial one because foreign and sports cars are still not fully accepted in this country. For that reason, I read "letters" before any other article to see what pros and cons are being posed regarding foreign and sports cars.

I have owned two sports cars and presently own a foreign make convertible. Why? Like many others I like and prefer a foreign car to any U. S. make. Many will agree with me, and just as many will disagree with me which is their right.

When I read the fourth "letter" in the March issue I did a slow burn! Whether or not "Name Withheld, Los Angeles, California" likes a foreign car makes no difference to me, but his last two statements were those of a very ignorant, stupid and dangerous man to have driving any type of vehicle. Evidently he feels that a foreign car deserves to be smashed up in an accident regardless of the serious and possibly fatal injuries the passengers of the car might sustain. He says he runs foreign cars onto the shoulder or into a curb whenever he has a chance. Because of that statement I say he is ignorant and very dangerous. He should not be allowed the privilege of driving a motor vehicle, foreign or U.S. made, on any highway in any state in this country. Both foreign made and U.S. made car owners will agree with me 100% I'm sure.

Ignorant and stupid people like "Name Withheld" cause far too many of our traffic accidents and fatalities each year. We can ill afford to have his type on our highways endangering the lives of people he likes to run off the road because he doesn't like their car.

I would like to write "Name Withheld" a personal letter, but, not only is he ignorant and stupid, he doesn't have the "guts" to sign his name to his "Epistle of Ignorance"!

Yours very truly,
John W. Humphrys, 1st Lt.
Otis AFB, Mass.

P.S. I am sure you will be swamped with letters regarding "Name Withheld" and his letter. If you should decide to print any of the rebuffs in next month's issue, and my letter should be among them, I would be more than happy for you to use all or any part of it. The more I think about that ignorant character, the more burned up I get.

The Editor: SCI

I was annoyed when I read a letter (right side, top of p. 4 of your magazine for March, 1956) written by a person in Los Angeles. First of all, conclusions should not be drawn by such accidents. The reason for the great deal of damage

to the VW and so little to the Nash is construction reasons. The VW is below average (but not poor because of size) in torsional strength while the Nash has one of the sturdiest constructions the world over. I wouldn't call the VW a death trap. Next, any man who has so little respect for *any* car to try to "push the beetles onto the shoulder or into a curb," should *not* have a driver's license.

Last but not least, I wish to complement you on the fine magazine. I like the section that illustrates the servicing of sports cars (Tuning an MG in February, 1956 and The S.U. Carburetor in March, 1956). These sections are very interesting and above all educating. I read your magazine from cover to cover with the exception of a few minor articles.

Yours truly,
CLINTON D. ZIMMERMAN, JR.
Allentown, Pennsylvania

The Editor: SCI

I wish you would inform Mr. "Name Withheld" of Los Angeles, California, that he should be rather selective in whose "Beetle" he proposes to push into the curb, because if it happens to be mine he will find himself in a heap on the opposite curb with his Hydramatic lever up his tail pipe.

I have always been a champion of the small car, having owned both the foreign and domestic products. At the present time I am the owner of that most formidable of American sports cars, a Willys ¼ ton 4 x 4, commonly known as a "Jeep."

Sincerely yours,
RHODES A. FINLEY
Santa Ana, California

The Editor: SCI

I suppose you printed the letter from that jerk who hates Volkswagens and other small cars because you found it funny on the surface.

He is not exactly funny. He suffers from a monumental inferiority complex, which shows itself in a desire to destroy everything and everyone sticking up out of the crowd.

To my brother Volkswagen drivers in California I say this—Watch for this bird. If he runs anybody off the road, or into a curb—he'll look natural behind bars—or under a lily.

Seriously, fellas—such a man is dangerous.

Name not to be withheld
HARVEY F. CURTIS
Somervill, Mass.

Investigation has shown that the unnamed writer of THAT letter does not have a valid operator's license.—Ed.

DRIVER'S REPORT

Plymouth Fury

A family-sized bomb with perfect road manners.

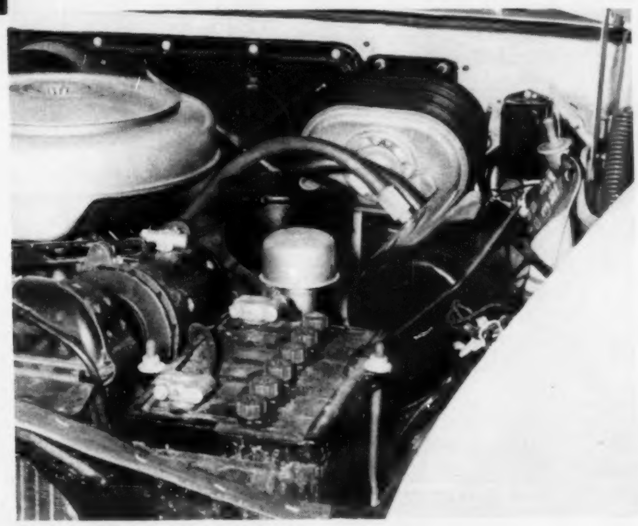
The Fury, gold and white two-door hardtop is newest of Plymouth's '56 line. Band is anodized aluminum inlay in gold. Drive train and suspension system are engineered for high performance.

by JOHN CHRISTY

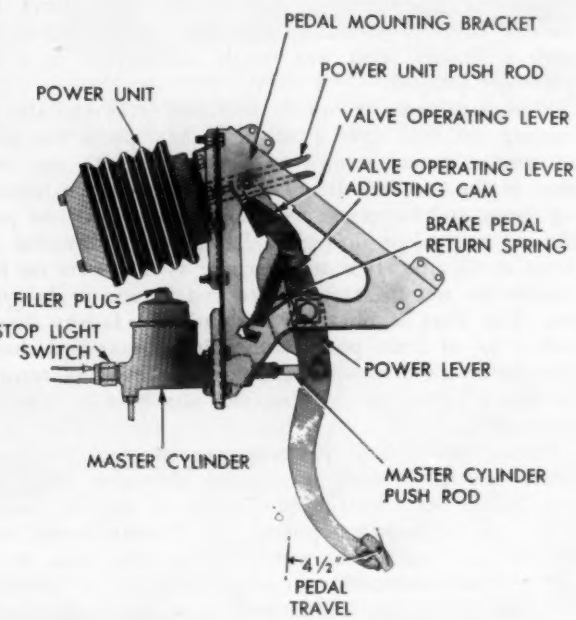
When Plymouth announced their new *Fury* earlier this year, they made it quite plain, in an unobtrusive sort of way, that they weren't about to let Ford and Chevrolet walk off with the power honors among the low-priced three. To put it another way, Plymouth, after years of producing economical, practical and often uninspiring transportation, has come up with an automobile that is nothing less than a going bomb.

Outwardly the car doesn't look like anything more than a luxury version of the Belvedere hardtop with gold trim

Cramped quarters under the hood leaves little room for the repairman to work efficiently. The high output V8 engine develops 240 bhp at 4800 rpm. Plymouth, mainly concerned with acceleration, worked on the low end of the scale for torque — 310 lbs.-ft at 2800 rpm.



ABOVE: Power assist unit as it sits on fire wall within easy reach. Unit gives forty percent assistance. BELOW: Diagram shows mounting and operation of new booster unit.



and a few extras. That is, not until it's placed alongside the Belvedere when a subtle difference becomes apparent — the Fury is an inch lower. That inch doesn't seem like much but strangely enough it seems to give the Fury a purposeful appearance lacking in the stock model. Nor is the look of purpose belied by the performance and general road manners of the car.

I took the car out of the Plymouth plant under somewhat less than ideal circumstances. Detroit's winter weather is for the most part just plain sloppy and this particular

SPECIFICATIONS
PLYMOUTH FURY

List price	$2800 (FOB, Detroit)	Axle ratio	3.54, 3.73, 3.9, 4.1, 4.3
Wheelbase	115 inches	Engine	90° V8
Tread – front	58.8 in.	Valves	OHV (rocker)
rear	58.9 in.	Head type	Polysphere
Length O.A.	204.8 in.	Bore	3.8125 in.
Height	58.8 in.	Stroke	3.3125 in.
Width	74.6 in.	Displacement	303 cu. in.
Weight	N/A (3300 lbs. approx.)	Comp. ratio	9.25 to 1
Steering Ratio O.A.	27.1 to 1	Max bhp	240 @ 4800 rpm
Turning radius	20 ft.	Max torque	310 @ 2800 rpm
Transmission	Optional		

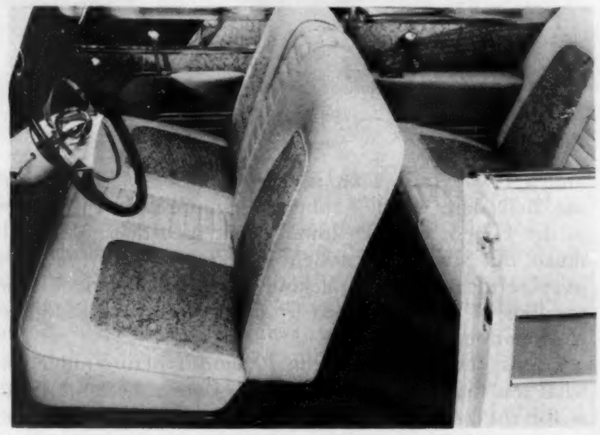
day was no exception; it didn't snow and it didn't exactly rain either. It slushed. The condition of the streets and roads can be imagined without much trouble. Yet despite the just plain awful weather and roads the new Plymouth handled like a thoroughbred except for a somewhat slow steering ratio which was to be expected on a car destined for family use.

The ride handed out by the Fury is totally different from that of any other Plymouth past or present. It is not stiff but neither is it soft or mushy – firm would probably be the best description. The street running past the Plymouth plant is cobblestone and of a non-rhythmic consistency guaranteed to batter any dental work into useable coinage. The Fury rode this rock-bed easily but with a firmness that was totally unexpected in a five-passenger product.

Slow, city turns definitely produced front end dip but moving out into open roads at higher speeds the whole suspension system seemed to tighten up with the result that as the car was driven harder through the bends it sat flatter and flatter as speed was increased. At one point the car was taken through a hard, decreasing-radius left bend at 45 mph. It rode the curve as if it were on rails despite the wet blacktop surface and it rode it absolutely flat. The Fury is obviously no ordinary factory hop-up with a lot of brute power stuffed into a standard chassis. The faster it's driven the greater the feeling of security. It's not a lulling feeling, however; you have to drive the automobile.

Unlike some factory power-wagons in which the power comes through with a long, slow, deceptive surge, the Fury hands out a belt in the region of the hip pockets as soon as the throttle is poked. The pressure doesn't relax until you let up on the pedal. Acceleration, even in the wet, was phenomenal for an ordinary appearing passenger car. Due to slippage, 0 to 30 mph was 4.4 seconds on each of four runs. Each time the throttle was poked the wheels spun, despite the Powerflite transmission with which

Rounding extremely slippery bend, Fury displays good holding power. Strangely enough car had tendency to soften up at low speeds.



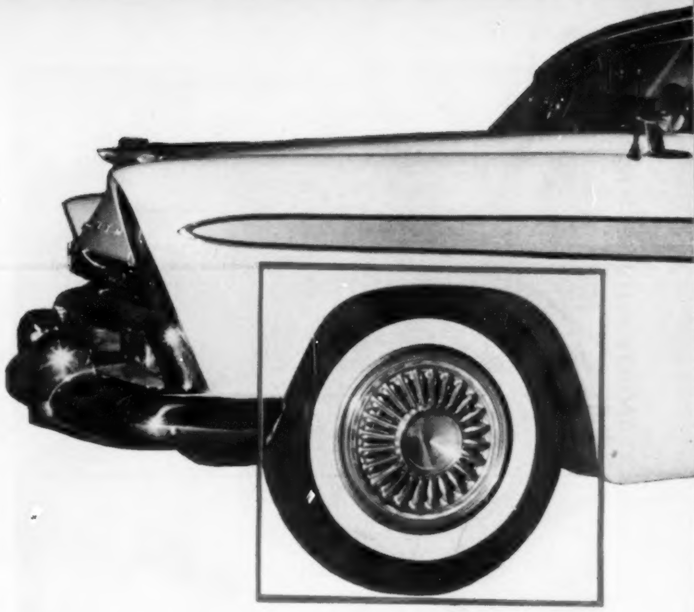
Interior of Fury comes in abstract pattern of gold and black with "live" bolsters in grained vinyl. Door panels and roof posts are trimmed in chromium.

the car was equipped. When they grabbed the sensation was that of being swatted from behind with a foam rubber bludgeon since nearly a full second was used up in just sitting and scratching for traction. Going from 0 to 45 mph with the pushbottom selector in Drive netted a time of seven seconds flat on two runs. With the selector in Low range the time dipped to 6.4 seconds, again with considerable slippage until the tires squeegeed themselves a bite on the slick blacktop.

The real eyeopener, though, was the 0 to 60 time. Using Low range, the car did its usual scratching, took a bite of the road, and then shot up to the 60 mark in just 9.2 seconds. In Drive range it made two runs in 10 seconds flat and in this case the shift occurred at about 45 at which point the car seemed to slow while the rear wheels buzzed madly against the slushy road for a new bite.

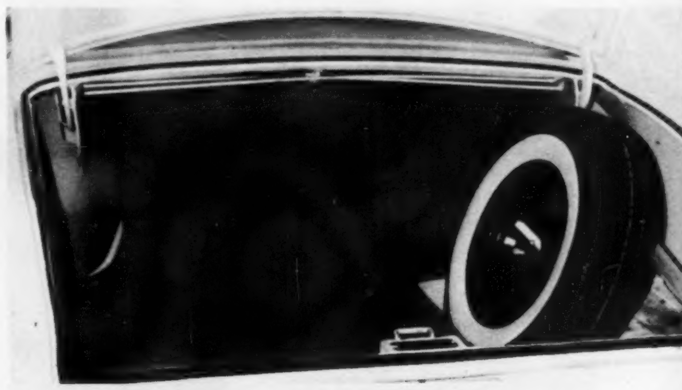
Considering that almost a full second was lost each time the car came out of the chute these times are somewhat better than quick, especially in view of the 3300-plus lb. dry weight of the car and the fact that it carried two passengers and myself during the runs. Being conservative and yet trying to be fair to the car, an extrapolated 0 to 60 time of slightly less than 8.5 seconds could probably be expected from a stock, show-room car if run on dry pavement at sea level. This one was certainly a showroom car since I was given a free pick from a line-up of them.

(Continued on page 65)



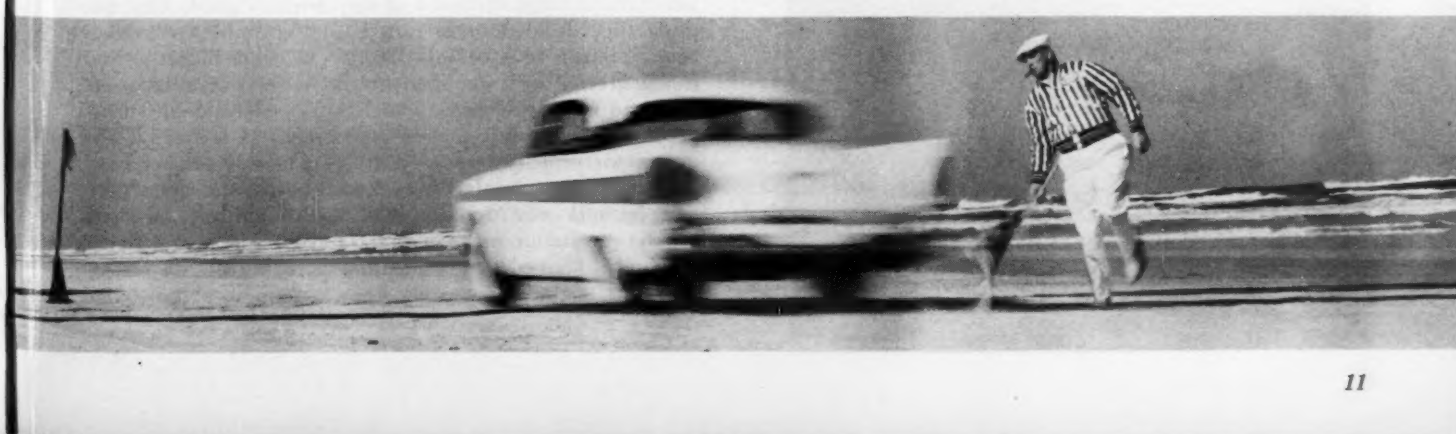
Wheel discs follow color motif of trim with gold center and silver spokes.

Here, Fury holds like glue on slushy turn at 40 mph. Car leaned less at higher speeds, and handled with ease. Pick-up out of turn was exceptional.



Trunk has normal space, and should carry luggage of average family with ease. Though Fury is medium-sized, it is luxurious in all appointments.

Fury speeds past finish line at Daytona Beach, Florida. Despite heavy headwind, Fury's acceleration and top speed showed car to be one of the hottest of low-priced three.



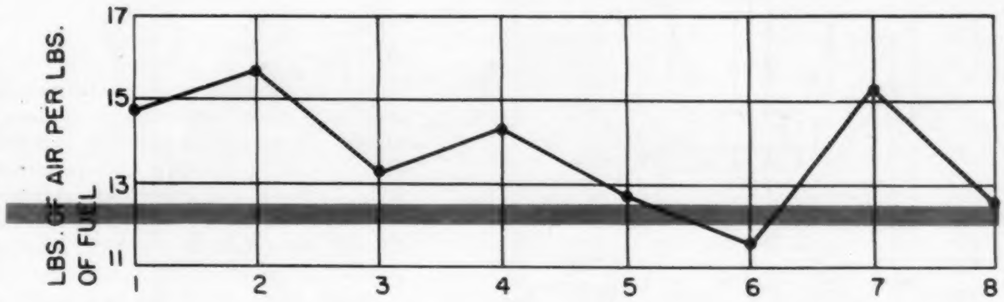
fuel injection for your next car

An accomplished fact, FI is coming as sure as the sunrise. Here is what it is and does.

ONE DAY in 1953 the International Sports Commission met in Paris to determine the rules that would govern Grand Prix competition for the next three years. The gentlemen pondered, discussed and finally reached a firm agreement. They'd rig the rules to handicap the one thing they were all afraid of – superchargers, which were making cars far too fast for anyone's good. The formula they decided upon pitted 2500 cc unblown engines against blown ones of just 750 cc (45 cubic inches!), and it was greeted with agonized howls by those manufacturers who had made two-stage supercharging a formidable, near-perfect weapon. But the decision stood. If it hadn't, the carburetor probably would not be on its way out today.

One of the manufacturers least enthusiastic about the new formula was Mercedes-Benz, which built its fantastic pre-war reputation on blown cars. But even if superchargers were out, Mercedes was not about to scuttle its racing plans. Its engineers, who had been certain until now that

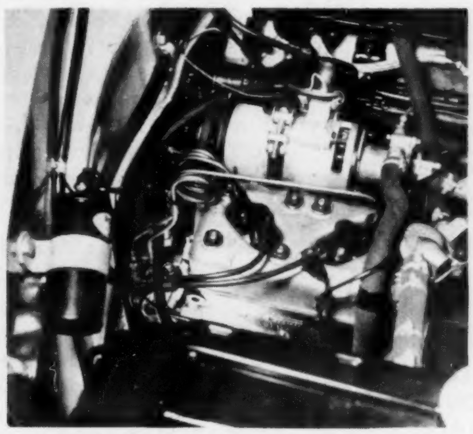
One of the things wrong with carburetors is that the fuel-air ratio mixed in the carburetor throat changes greatly by the time it reaches an engine's far-flung cylinders. The graph shows typical variations in fuel-air ratio "slugs" that actually reach the cylinders of an in-line 8-cylinder engine. A good FI system would give a horizontal-line graph (red line) lying between 11 and 12 on the vertical axis.



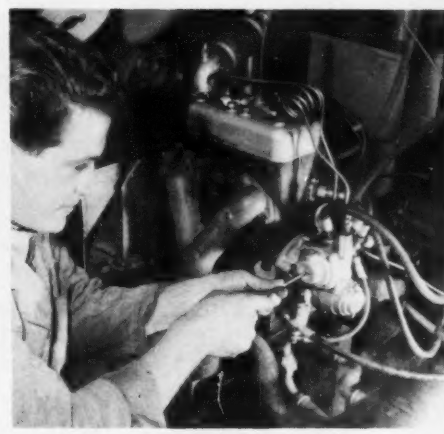
(Graph from Obert's "Internal Combustion Engines," 9th edit.)

By GRIFF BORGESON

BMW, winner of Grand Prix motorcycle races, is equipped with the Bosch gas injector. Injector pump mounts high at front of engine.



Goliath two-stroke car, made by Carl Borgward, uses Bosch fuel injection. It pays for extra cost in performance and economy.



Here, mechanic adjusts travel of injector pump control rod. While system seems complex, adjustment is simpler than most.

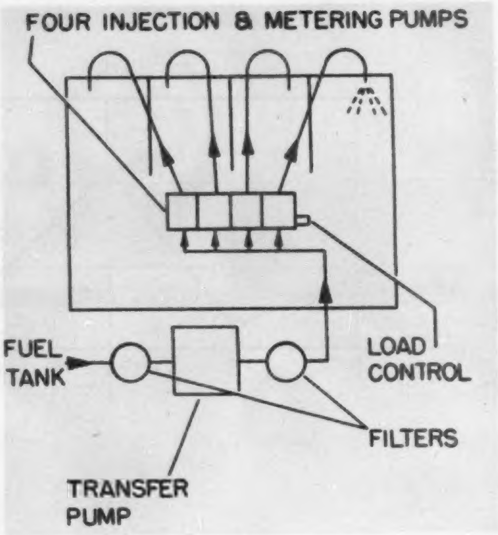
the unblown engine had reached the limits of its development, began casting about for something that would prove them wrong. They found it in a device that had been familiar in diesels since the Twenties, in aircraft since World War II, and in some alcohol-burning race cars since 1949: fuel injection. Working in secret with the Robert Bosch company, they worked out new FI systems for both alcohol and gasoline and used them in their 300 SL, production sports car, their 300 SLR competition sports car, and their Grand Prix machine. FI was a costly area for experimentation but well worth the investment. In '55, aided by Fangio, Moss and others, FI helped Mercedes walk away with the G.P. world's championship, the sports car world's championship and the European touring car championship.

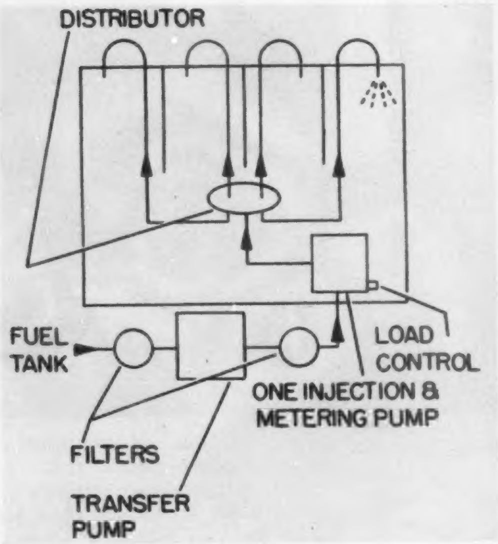
Repercussions from the original Mercedes experiment with FI began immediately. German economy cars, Gutbrod and Goliath, made FI optionally available. Then FI penetrated world's championship motorcycle competition, via B.M.W. and Moto Guzzi. Borgward's record-setting sports cars used it and so did the Grand Prix Alta and Connaught. As we go to press, rumor is that Ferrari's '56 Indianapolis contender will use FI. It will just about have to if it's going to compete with the Offys, most of which have been running without carburetors for seven years.

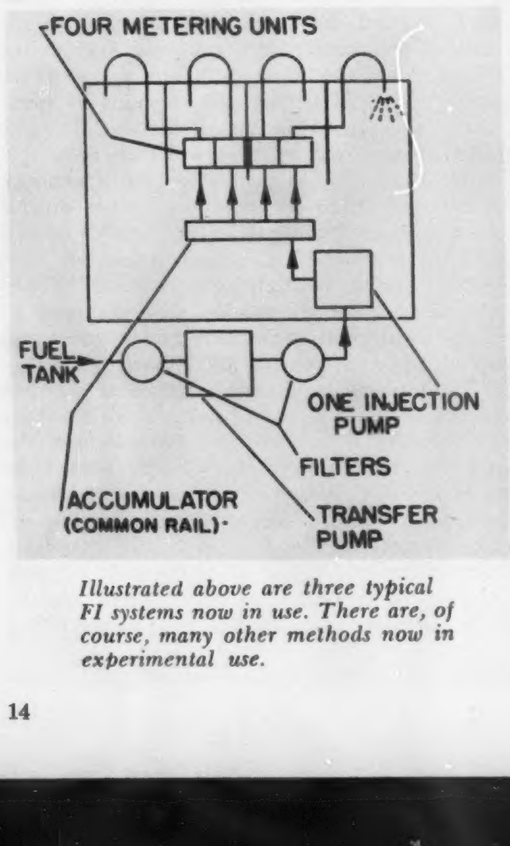
FI is no dream-scheme of the future; it is an accomplished fact. It entered the sports car field through the back door and it will invade the family-car field in the same way. This time the cause will not primarily be performance but looks. FI permits the chucking of space-consuming carbs, air cleaners and manifolds, and thus permits hood lines at least four inches lower than those that sell today. The low, slinky FI profile will be a gimmick that Detroit can market to the motoring masses on the grounds of novelty and beauty. Add the "gravy" of performance and fuel economy and it's an unbeatable combination. And it's coming as surely as the sunrise.

This is not just a personal opinion. I've discussed FI with at least a dozen product-planners and engineers in Detroit and they all agree that it's just a matter of a year or two until FI shows up as optional equipment on some cars and standard on some of the higher-priced lines. Cars that will probably get it first are the Thunderbird, the Corvette, and the high-performance models offered by Chrysler and Studebaker. Four years from now FI should be about as commonplace as automatic transmission on cars in all price brackets.

FI progress overseas will follow about the same pattern. European budgets for research and development may be relatively small, but there as in the U.S. most of the initial







Illustrated above are three typical FI systems now in use. There are, of course, many other methods now in experimental use.

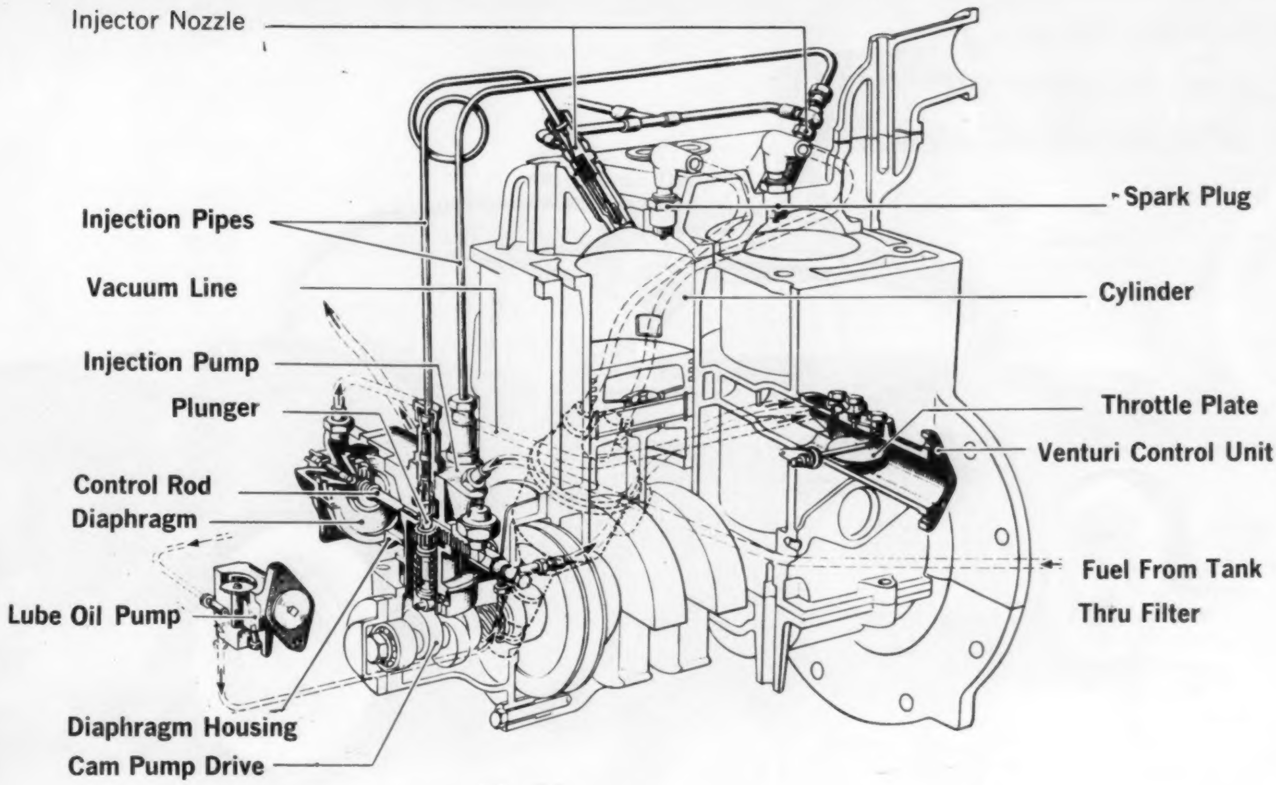
costs were absorbed years ago by manufacturers of FI equipment for diesel and aircraft engines. In Germany FI is already recognized as the only rational way to charge the cylinders of four-stroke and two-stroke gasoline engines. Italy, England and France are approaching the same realization. Even so, it's near certainty that wide mass use of FI will occur first in the U.S., because of the big-volume production on which the U.S. industry is based.

Nearly every article or technical paper on FI that has appeared to date has led the reader through the exotic intricacies of one or more of the FI systems most likely to be adopted by the U.S. industry. We will avoid this here, because a really accurate and complete description of even one system would hardly leave space for a general picture of what FI is and does. And this would be only a starter. The FI systems of GMC, International Harvester, Caterpillar, Cooper-Bessemer, Cummins, German Bosch, American Bosch, Stromberg-Bendix, Lucas, S.U.-Simmonds, Guzzi, Fuelcharger and Roosa-Master are all fairly likely contenders, and a comprehensive description of each of them would fill a big, thick and fairly dull book. Instead, we'll define the basic principles of *all* FI systems, leaving the details of specific makes for progress reports in the future.

All FI systems contain:

1. A fuel tank.
2. A transfer pump much like a conventional fuel pump, which carries fuel from the tank to
3. An injection pump, which delivers the fuel under high pressure to
4. The injection spray nozzles, one for each cylinder of the engine.
5. Fuel filters for protection of injector pump and nozzles.
6. A "throttle" and fuel feed mechanism, which usually responds automatically to engine load, rpm, and inlet vacuum.

View of the W196 engine. The throttle body, foreground, which controls the air-intake also regulates the amount of fuel injected. It operates on a vacuum much the same as a distributor vacuum advance.

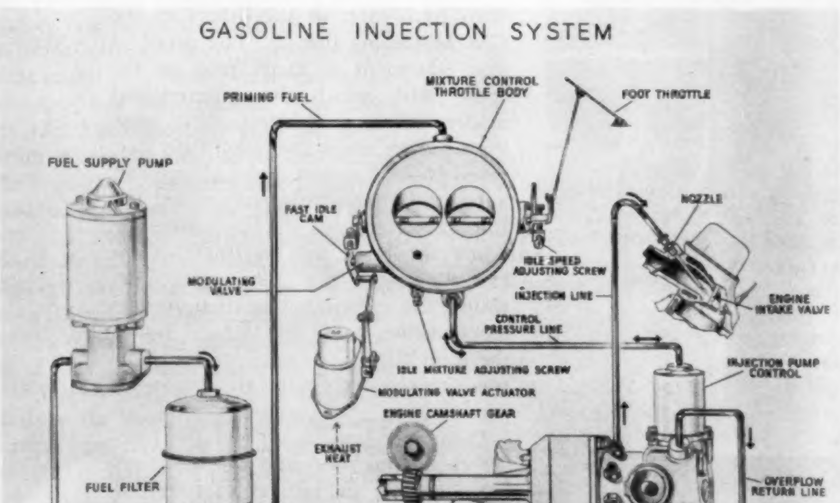


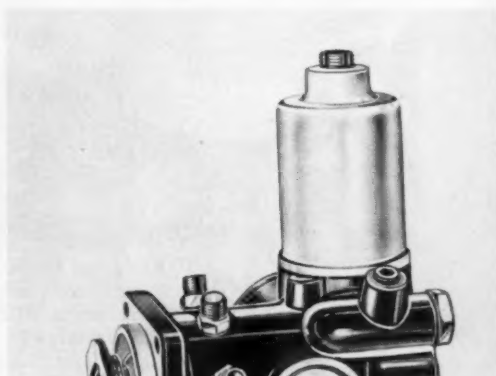
Simple cutaway drawing of the Goliath two-stroke engine shows layout of the entire Bosch injector system.

Some FI systems have "direct" injection into the cylinders, with nozzles in the combustion chamber or the cylinder wall. "Indirect" systems inject into the intake ports, using either a carburetor manifold or a manifold specifically designed for FI. Some systems use a separate injector pump for each cylinder; others use a single injection pump for all the cylinders, feeding them by means of a distributor and metering device. With some there is intermittent injection of fuel, timed to take place mainly during the suction or intake stroke; with others the injection is continuous during all four strokes of the engine's cycle.

A great number of variations has been played on these themes. Some have proved to be especially applicable to touring cars, others to racing cars or aircraft. Each of them has shown that the right FI system is a vast improvement over conventional carburetion.

(Continued on page 63)

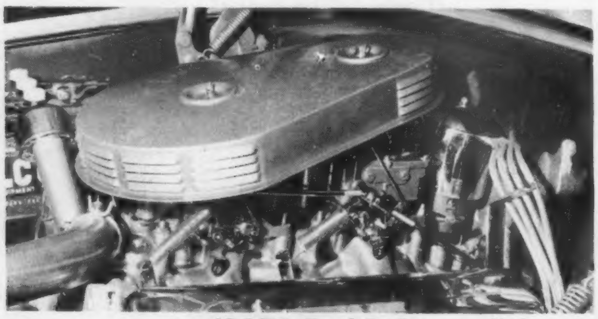




This is the American Bosch PDA pump, one of the first to be set-up for mass production. Operation is similar to distributor ignition systems.

corvette impala:

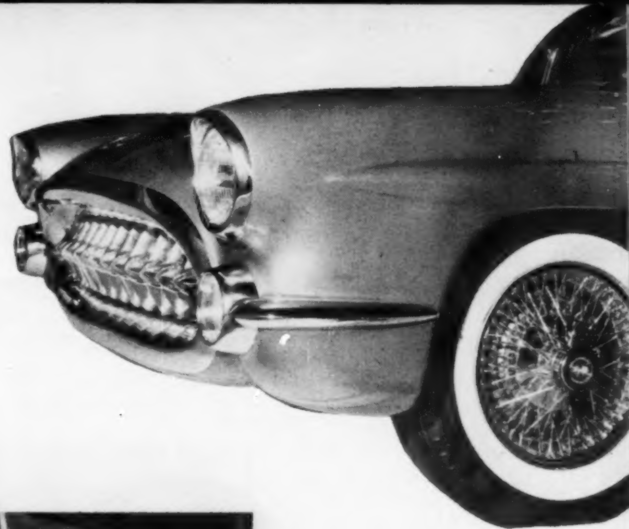
THE SHAPE OF CHEVIES TO COME?



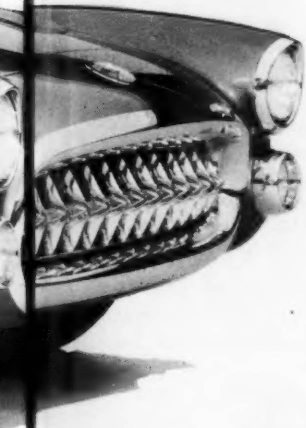
ABOVE: Dual Carburetors linked by one air cleaner are Carter four-barrel units. BELOW: Rear seat permits only two passengers to ride. Center rest is also small compartment. Courtesy light is under arm rest.

CHEVROLET's recent "dream cars" have all shown a far more realistic, down to earth approach than have most of the others in the GM Motorama line-up. The proof of that statement is easily seen in the speed with which the experimental models reach production. First came the Corvette, then the beautifully executed Nomad wagon. From all appearances the latest dream car, called the Impala after an African antelope noted for grace and swiftness, is no exception. A five passenger sport coupe, the car embodies all those elements which could be lumped under the term "Gran Turismo" without borrowing excessively from the European practice.

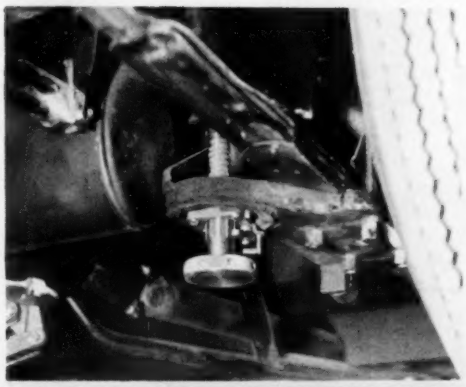
From a styling standpoint the lines are clean and crisp and the designers have made a definite effort to avoid useless fins and the excessive chrome gimmicks so often used to hide styling errors. The result is an eminently practical car that is light in appearance and yet retains the solid usefulness of the ever popular hard-top coupe or sedan. Like the hard-top, the Impala,



Impala features Dayton wire wheels with knock-off hubs. Grinning grille is susceptible to damage even in light traffic.



Handles and buttons are recessed and rounded for safety. Appointments are simple and neat.



Apparently equipped with integral jacks at all four wheels. Manufacturer's comment was wry smile.

Instruments are set directly in front of driver. Note foot emergency brake. Deep dish wheel is padded.

though small in appearance, is no midget. Wheelbase and tread are the same as those of Chevrolets in current production and the interior is fully as roomy as any standard five passenger coupe now in the street.

On the show car the interior is a bit futuristic for production as is the instrumentation which is definitely inferior to that of the Corvette. Upholstery is in a combination of blue leather and metallic fabric tinted a silver blue, a dreamlike combination unlikely to see production if only for price alone. Safety is a major motif in the Impala interior; virtually every corner or edge that might be a bludgeon in case of an accident has been padded most thoroughly. Even the long grab rail fitted from steering column to the end of the dash on the passenger's side is heavily padded and covered in leather. There are no "cookie cutter" instrument bezels or punch-like knobs on the dash and all the instruments are grouped in a shielded housing directly ahead of the driver. The steering wheel, too, is of the deep-dish safety design and the large center spoke is as well padded as the grab rail. All door latch handles are recessed in wells to prevent any chance of catching in clothing. In fact, the whole interior feels as though the car could be ridden over Niagara Falls with little more discomfort than would be afforded by the fabled padded barrel.

Power for the Impala comes from a 1956 Corvette engine—one more item

(Continued on page 58)

By JACK SCALES

It's not surprising that the Opel Kapitan has a familiar look to us, since it is built by G.M.'s German subsidiary.

Have European Cars Lost Their Distinction?

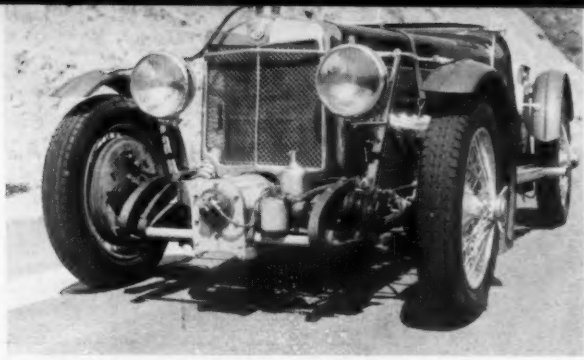
SEEN and heard at a motor show:

"Ah, there's the Studebaker . . . or is it a Nash? No, I guess it's the new Standard, or maybe that Sunbeam. Anyway, let's look at this Wolseley or Riley. Nope, it's an MG Magnette. But what's this old Hudson doing here? Oops, the new Jaguar. Now this could be a Healey or an MG, but is that a Corvette or a Lancia Spyder? Here's a Willys, though . . . no, wrong again: it's a Vauxhall Cresta. Is this the Ford or the Austin stand? Is that an Aston or an Alvis? Pegaso or 300 SL? A.C. or Ferrari? Renault or Peugeot? Fiat or Alfa?"

This unfortunate individual may never recover, but his concern over a regrettable situation is shared by all those who are at all interested in worldwide automotive trade. Somehow, the world's cars *are* beginning to look rather alike, and true distinction becomes more and more an elusive commodity. One has the impression that everyone is trying very hard to please everyone else, but that they aren't going at it in the right way. I do not intend to present a brief for the classic sports car or the futuristic prototype, but let's take a look at some schools of design in relation to their purposes and justifications.

Still warm in the hearts of many enthusiasts are the sports cars of the middle 1930's. English thought then, as now, was markedly different from that on the Continent. The English sports car, as finally typified by the MG TC, can be said to have represented the very highest development of the pre-automotive carriage. Mellowed and perfected through the years, the concept of big wheels, a flexible chassis and four leaf springs reached its finest form in England, and it was only natural that these cars were usually refined, durable, well fitted to the driver and great fun to dash around in. They were perfectly suited to the smooth yet winding English type of road.

Continental sports cars were usually developed from Grand Prix machines, while the English preferred to work the other way around, as typified by the Riley-based E.R.A. Italian thought in particular has always been to detune the G.P. car for road use, and Alfa-Romeo did this commonly between the wars. This procedure insured that their sports cars would always take advantage of the latest in technical developments, and as a result they were most interesting, usually faster, but not more durable than their English counterparts. We can say simply that European designers were unfettered by the trans-channel carriage tradition.



Typifying the Classic school of design, the MG K3 Magnette was a high development of a basically outdated concept.

An obvious case, the Sunbeam Rapier has combined several current U. S. design idioms in an attempt to win approval of the dollar market.

G.M. has done it in England too, their latest Vauxhall series having the grille of our departed Willys plus very American two-toning.

Ford cut deeply into European territory with the very popular Thunderbird, and thus set off much of the current confusion there.

The years described above were notable in America for utter dullness in automotive design, and gave U.S. techniques a very bad name throughout the world. During the Second War, many British-based Americans found driving a sport again. The English were quick to exploit this situation, for they coupled a dire need for stable dollars with the ability to get into production far faster than their badly damaged continental neighbors.

Spearheaded by Austin, and followed in by MG and Jaguar, the British almost completely sacrificed their home market to establish themselves in the American scene. They experimented with sales techniques, and explored the problems of distant parts and dealers. Many suffered from gross mishandling of these essentials, Singer in particular being an example of a car with considerable potential which was nullified by clumsiness in dealer selection and supply.

Such lessons were not lost on the Germans, and when their factories were rehabilitated they lost little time in building a strong American distribution structure for Volkswagen cars. Dealer requirements were always stiff for VW, and are presently tightening up, if such is possible. This care plus a good product have placed some 42,000 Volkswagens on these shores, 35,000 having arrived during 1955. In sharp contrast the English market share has fallen off, some makes being down as much as 40 percent. There will be no let-up from Wolfsburg, though, the VW sales target for 1956 being 85,000 units. If they don't achieve this, it looks like we can blame the market and not the competition.

Serious opposition for all imports is arising from the battle for "sports car" honors among the U.S. makers, and right now many observers are accepting this as the next phase in the great post-war specialized-car boom. From 1951 through 1953 the combined sales of Hillman, Morris, Austin and British Ford averaged 14,000 annually, and in 1955 the Thunderbird alone topped this by 2000. Sales of those four cars have dropped to half their former level. The T-Bird has been rejuvenated to meet a hot new Corvette, and some feel that the future of the imported sports roadster is beginning to look a bit bleak. The view, in fact, may be even darker once the '56 Corvette has turned a few laps in competition.

Look at it this way, though. If it weren't for the British, and their pioneer efforts in the U.S., there would almost certainly be no Corvette today. Yet, they are the hardest hit by the competition from within that they themselves have forced. There have been some changes made, and some attractive new models introduced, but their approach as a whole must be faulty in some way, to have caused such losses in the face of growing overall "personal car" volume. Perhaps we may learn something by looking over the English attitude toward the American market and comparing it with the views of their fellow exporters.

A key to the British approach may have been provided by an article on the U.S. market in *The Times* (London) show issue, where John Dugdale first says: ". . . . above all the American customer is looking to the imported car for something different from that which he can find on the home market — and to something of superior quality." This is fine, but a page or so further Mr. Dugdale goes on with: ". . . It has also been desirable to adapt the product in keeping with sales demand. Gay, light pastel colors are a

(Continued on page 62)

MOST sports car fans enjoy the passive pleasure of spinning dreams about THE car, THE car being one of the fine existing machines or an amalgamation of the best features of many different cars. This is the car they'd like to own, if, when, and in spite of. For almost all of us this is just talk, but there *are* a few men who can make their dreams come true. Chances are they don't want to do it themselves, though, and this is where Bill Frick steps in.

Famed for the time-bomb Fordillacs and Studillacs, honored for the 1950 Le Mans Cadillacs, and revered for the Cadillac-Allard, Willie Frick is probably the greatest Caddy exponent east of Frank Burrell at that company's experimental garage. Willie has reached a complete understanding with those rugged OHV engines, and knows just what he can and can't get away with. As a result, the only standard part in a Bill Frick Special is a current Cadillac powerplant. From that point on, it's up to you.

Bill Frick Motors, of Rockville Center, Long Island, will build that dream car for you, just the way you want it. For that reason, there's really no such thing as a "catalogue" Bill Frick Special. The specifications are as flexible as your imagination and pocketbook, the finished price being remarkably low for a completely custom-built and personalized automobile. The minimum tag, for a reasonably unmodified interpretation such as the shop demonstrator, will run around $8750. As inferred before, there's no upper limit.

Naturally, you can't have a dream car right away. A wait of four to five months from order to first drive is required for an "ordinary" Special, while you might have to control yourself as long as seven months for a more spectacular version.

First decision in building a Bill Frick Special is the selection of a chassis. Frames are never of a specific make, Studebaker components having been used among others, since all parts are extensively reworked and built-up. A characteristic layout might include two channel side rails, with one front crossmember, a large X-member in the center, and two rear crossmembers. All channel sections are reinforced by boxing, which results in exceptional stiffness for this type of frame.

The Bill Frick Special with body by Vignale is seventeen feet long, six wide. Although this Special is not for sale, a similar custom built job will cost less than the Mark II Continental, and offer superior appointments and performance. Tests show, with '55 Caddy engine, Special will go 0-60 in 7.2 seconds.

Bill Frick Special:

America's Answer

The simple Vignale grille offers a maximum of cooling for the 310 horses lying beneath the hood ready to leap into action.

Wheelbases can vary from 110 to 124 inches, the demonstrator measuring 114. This car also had a slight crab-track, the front tread dimension of 56/16 inches being an inch larger than that in the rear.

Equally problematical and irrelevant is the exact origin of the unequal wishbone front suspension, the lower arms of which are connected by a torsion anti-roll bar. Coil springs support the weight, and enclose Armstrong shock absorbers with any settings either side of 50/50. A Ross gear handles the steering problem, and a Thunderbird column can be used to provide easy wheel position adjustment. Rear suspension is by semi-elliptics, but the axle is positively located and all torque reactions absorbed by two radius rods and a lateral sway bar. Armstrong tubular shocks are again used, "sea-leg" mounted to fight roll. Actually, with a sway bar in use vertical mounting might be even more effective, but again this is your choice to make.

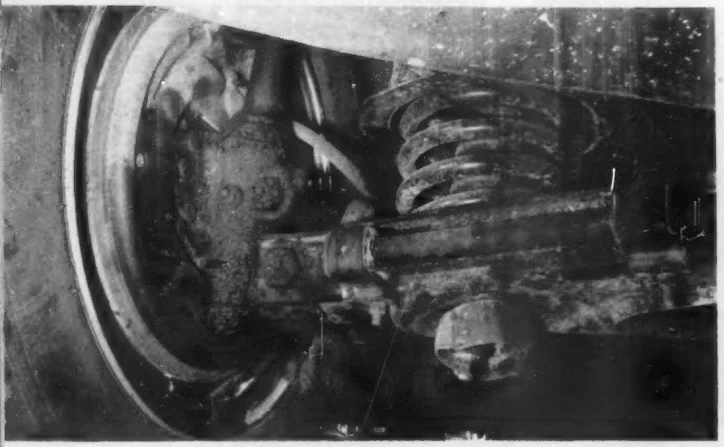
Braking is usually by Chrysler-type two-leading-shoe front mechanisms in combination with the Bendix pattern at the rear. These operate within 11½ inch drums, and can be actuated by a single Lockhead master cylinder. Many wheel options are available, the choice running from Detroit discs and Dayton or Borrani wires to Halibrand's magnesium lightweights. The size is usually 15 inch, though, and a typical tire might be 6.70 x 15.

Reposing just behind that front crossmember is, you may have noted, a Cadillac engine. Bill Frick is prepared to give you anything up to 350 horsepower, but he doesn't like to do it by modifications of valve timing, carburetion or anything else that might spoil running smoothness. The Special is primarily a fast touring machine for an owner who appreciates refinement, and Bill would like to retain this characteristic above all else. This still leaves room for his standard Cadillac techniques, though, which include extensive boring,

By CHARLES ERICSON

to Europe

From any angle, the Vignale body shows clean, unmarred lines. In spite of low-slung lines, the car gives complete visibility to the driver.



Undershot of front suspension shows heavy torsion anti-roll bar for stability at high speeds and sharp curves. While Studebaker steering and Bendix brakes are shown here, the choice of frame is up to the customer.

Trunk deck-lid is padded for sound absorption. Note the gas filler pipe inside the trunk. The inconvenience of opening the trunk to fill up is far outweighed by the smooth, uncluttered body lines.

To keep hood height low, special double air cleaner is used. This is a standard Caddy engine. As is, stock power-to weight ratio is 12.1 to 1.

Despite seeming snugness under hood, everything is readily accessible for minor repairs and adjustments. Layout is neat and compact.

a McCulloch supercharger, or a combination of both. Frick Motors have long been stretching Caddies to 390 cubic inches, and with a blower on this you have real speed with silence. The factory car has a standard '55 Cadillac engine, with special double air cleaner to lower hood height.

Torque can be transmitted via dual-range Hydra-Matic, which can be fitted stock or with raised shift points. Early floor controls were straight-line progressive type, but a new lever gate is being devised, for surer selection by "feel." If you want something a little more flexible and challenging in gear changing, Bill Frick thinks he has just the answer. He has already built some cars with the good but expensive German ZF four speed gearbox, but he's now trying out a new French unit. It's the Ponte-a-Mousson transmission, as used in the De Soto-powered Facel Vega. Also supplying four speeds, this box looks to Bill like a good candidate for use with U. S. V8's, and we will have a better idea after his pilot installation gets on the road.

A Hardy Spicer propeller shaft with two universals carries the load to the hypoid rear axle, which is often found to be of Lincoln origin. Final drive ratios may vary from 2.91 to 4.15, according to your touring tastes, and the Lyeth Hi-Tork differential can be substituted for a less discriminating unit.

With the addition of American electrical wiring, these parts make up a running Special chassis, which is then ready to be shipped to the bodybuilder. This has always been the well-known Italian Vignale firm, which has also supplied bodies to Fina and Cunningham in the U. S. This company's broad experience allows it to fill most requirements accurately and with taste, so the purchaser again has a free hand there. Through its size, the car lends itself to occasional four-seater treatment, and both convertible and coupe bodies have been fitted.

Upholstery is usually in unborn calf hide, interior hardware of German silver. The driver sits behind a wood-rimmed 18¼ inch steering wheel facing a suitably imposing array of dials. Instruments have Stewart-Warner works with Vignale faces, and on the demonstrator included clock, speedometer, tachometer, oil temperature and pressure, water temperature, manifold vacuum, and fuel level and pressure.

Instruments are placed directly before driver for quick spot checking. Adjustable steering column is reminiscent of Thunderbird.

Recessed headlamps are shaded by body preventing oversplash of light. Yet removal and installation of new unit is simply accomplished.

When all these amenities have been supplied by Vignale, the car goes back on a boat, and Frick Motors does the rest. Quite a few tasks remain, not the least of them being the job of trimming the height of the car with body fitted. There is no telling just how heavy a Vignale body will be, so much juggling of spring leaves is in order. The completed cars scale between 3600 and 3800 pounds, divided almost equally between front and rear axles. At this point accessories may also be added, most selections being made from the Cadillac range. After a tune-up, a touch-up, and a final fitting-out, another completely personal Frick Special is ready for delivery.

Though not attempting anything even approaching a road impression, we kicked the "works" car around enough to get a general idea of its attitude. At roughly seventeen feet long and six feet wide this is not a small car, and at first we felt a little lost amid the scaled-up sports car surroundings. The steering, at 4⅔ turns lock to lock, was too slow for quick correction and had an annoying bit of play in the straight-ahead position. This would probably adjust out, at the possible risk of some stiffness. The two-leading-shoe front brakes quickly announced their presence at a pedal touch, braking being very sharp until the proper pressure was determined.

Most impressive aspect of the car was, understandably, the performance. With correct use of the Hydra-Matic control, the Cadillac could be taken to any desired speed in the gears, and it moved out with a satisfying surge. Thanks to proper radius rods, the drive line is slop-free and response is immediate. The slow steering can be bypassed and sharp turns made by a mere touch of the throttle, behavior being surprisingly stable and flat in most situations. The Special was above par for a car of its size in most respects save the steering, and one can't help thinking that Frick might do better to admit that he has a heavy car and fit it with quicker power controls.

Now going through the construction process is one of the most interesting Bill Frick Specials yet, with power by Eldorado. Transmission will be by Ponte-a-Mousson gearbox and Hi-Tork rear end, the whole being clothed in a four-passenger coupe with a *full-length* sliding roof. #

Driver's back rest can be tilted back or forward to assume various driving positions. The seat itself is adjustable for leg length. Seat and back can be changed while driving for optimum comfort.

The interior appointments of the Special are immaculately fitted and customized. The padded inside offers safety in every corner. The back rest for the rear passengers has been removed to show excellent fitting of matting.

SCI

ROAD TEST:

Chevrolet

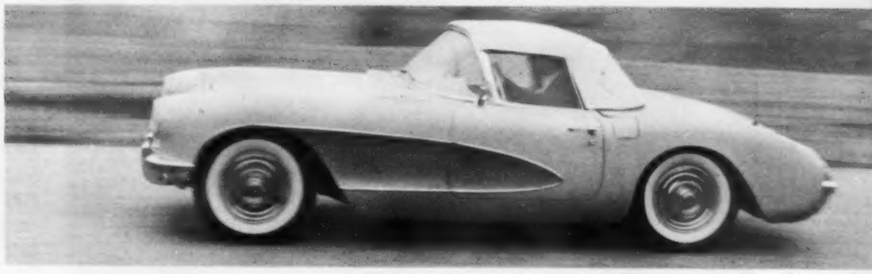
Here the author takes a long, fast turn at 60 mph. Note that the rear dips more than front, giving car an understeer effect. Stiffer shocks and springs on the back end would add stability on bends.

By KARL LUDVIGSEN

CHANCES are that by the time you read this the '56 Corvette will have made a profound impression on the whole sports car world, and after having had one under me for a couple of days I will be the last to be surprised. This very early production model showed a willingness and ability to be driven fast and hard under almost all conditions and demonstrated an even greater potential for competitive use. In my opinion, the Corvette as it stands is fully as much a dual-purpose machine as the

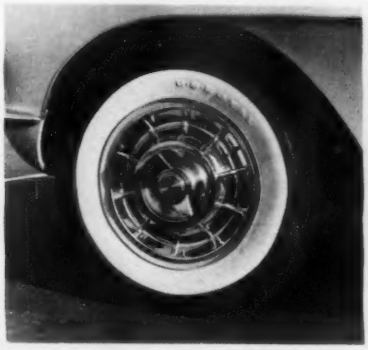
Photos by Don Typond

Although automatically raised and lowered, the top's back window has to be pulled down by hand. This is no problem since the well fitted top clamps down quickly sans fuss.



Cruising at 85, the Corvette produces wind noise over top. However, at such speeds there's bound to be wind disturbance on any car.

Corvette



The Halibrand type knock-offs look like the McCoy, but are actually wheel discs. The real thing is being planned as possible optional equipment.

stock Jaguar, Triumph, or Austin-Healey. Without qualification, General Motors is now building a sports car.

Unfortunately, at this writing accurate information both on the Corvette itself and on their future plans is not available, and the air is rife with rumor. SCI's test car was chassis #1002, and was obtained from the Chevrolet Motor Division through the combined efforts of Shelly Spindel and Alvin Schwartz Chevrolet of Brooklyn, N. Y. Finished in two-tone turquoise with a matching hard top and a white convertible top, it was a real traffic-stopper, and was specifically destined to make a New York TV appearance. As such, it had the full range of options, including whitewalls, the hard top, power windows, radio, heater and windshield washer. To our joy it had the close-ratio stick shift, but less happily had the higher, 3.27:1 rear end ratio. It was, all in all, a lot of car and I regret that at this time Chevrolet was not ready to discuss prices. There is little question, though, that it is to be competitive with the Thunderbird.

Now that the "dual-purpose" claim has been made, it should be backed up. Those accustomed to GM products may tend to take the creature comforts for granted, but any owner of an older Corvette will readily testify that those cars could be uninhabitable at times. Much effort has been expended to rectify this, and it has paid off in full.

Entry and exit over the wide sill on the passenger side is easy, for a sports car, but as the driver slides under the steering wheel he becomes aware of one of the car's few major faults. While it is handsome, and provided with more than enough finger ribbing, the wheel is too close to the driver and is non-adjustable. Ex-Jag drivers may find the position natural, but I personally felt that more arm room would be useful, particularly for competition. You also sit close enough to the door for the integral arm rest to be in the way.

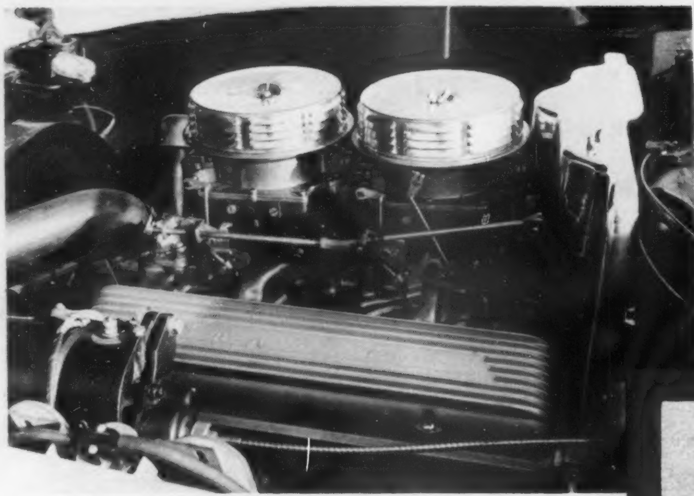
The seats themselves are very handsome, and very deceptive. They look like a true bucket type, and the seat bottoms are comfortable enough, but the backs are bolt upright and provide no lateral support for the torso. Adjustment of rake and a more definite "bucket" would improve them greatly and would obviate a certain amount of fatigue that now occurs. Fore-and-aft adjustment is not extensive, there being just enough room for a six-footer. Leg room is excellent; the left foot can roam about under the suspended pedals, and the brake and throttle are well-placed for heel-and-toe downshifting.

Headroom is also at the bare minimum for six feet of height, with slightly more room under the soft top. In general, the Corvette has very little interior room for such a large car, and it seems that neither GM nor Ford have yet completely solved the sports car seating problem.

Driving the Corvette with the top down is very pleasant, the windshield giving good protection to the top and side. You sit high enough to rest your elbow comfortably on the door, if so inclined. The power windows are handy and reliable, but the power-operated top qualifies as the most fascinating mechanism I have seen on any car. The lid rises, the top emerges, and the lid closes again as the control button is pressed. You must then pull down and clamp the back window section by hand, and close two front latches. It's all very easy, and the finished product is attractive and tight. It can be stowed away just as simply.

The hard top is also easy to install, having two clamps at the front and three bolts and two locating dowels at the rear. It is well finished and padded, and provides unobstructed vision. Light and easy to transport, the top's main fault is arbitrary sealing at the sides of the rear deck.

Instrument panel layout is identical to last year's cars, and has many of the same faults. All the secondary instruments, including the tachometer, are very difficult to read



Twin four-barrel carburetors squat on power plant ready to help deliver 225 bhp at 5200 rpm. At low speeds, only rear carburetor functions. BELOW—Hood raises from rear, reducing possible lifting at high speed. Engine compartment is more accessible for shop work.

A lack of bumpers at the rear will make any Corvette driver over-cautious when backing. Exhaust tubes are in for abuse.

SPECIFICATIONS
CHEVROLET CORVETTE

ENGINE

Cylinders	V8
Bore and stroke	3.75 in x 3.00 in (95 mm x 76 mm)
Displacement	265 cu in (4340 cc)
Compression ration	9.25:1
Max. horsepower	225 bhp @ 5200 rpm
Max. torque	270 lb ft @ 3600 rpm
Max. b.m.e.p.	154 psi

CHASSIS

Wheelbase	102 in
Front track	57 in
Rear track	59 in
Curb weight	2980 lbs
Front/rear distribution	52/48
Test weight	3250 lbs
Turns lock to lock	3.6

Gear ratios:

Gear	*Standard*	*Optional*
3rd	3.55	3.27
2nd	4.65	4.28
1st	7.84	7.22
Rev	7.84	7.22

Tire size	6.70 x 15
Brake lining area	158.0 sq in
Fuel capacity	17 gal

PERFORMANCE

TEST CONDITIONS

40°F, light wind, dry concrete surface at sea level.

SPEEDS IN GEARS

Gear	*True mph*	*(Car) mph*
1st	64	(60)
2nd	108	(102)
3rd	118.5	(110)
Best run	120.0	

ACCELERATION

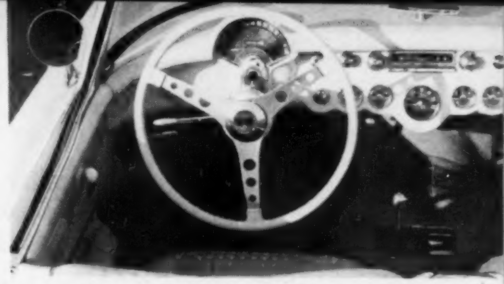
Range	*Time, Seconds*	*Gears Used*
0-30	3.4	1st
0-40	4.6	"
0-50	6.0	"
0-60	7.5	"
0-70	10.0	1st, 2nd
0-80	12.5	" "
0-90	15.8	" "
0-100	19.3	" "
50-70	4.5	2nd
50-70	5.8	3rd
60-80	4.7	2nd
60-80	7.0	3rd
Standing ¼ mile	15.9	1st, 2nd

Speed at end of quarter ....91 mph

FUEL CONSUMPTION

Hard driving ....12 mpg (tank mileage)

View shows sleekness of new Corvette. Except for phony air-scoops and knock-off type discs, the car is functional in design.



Instruments are well balanced for eye-appeal, but not practical. Reading them at any speed over forty is difficult. Note simple design of steering wheel.

Small luggage compartment makes long trips restrictive. Jack fits inside spare to conserve space. Larger trunk would destroy line, increase weight.

Fully automatic, the top slips out of the well after the lid raises. Convenience of automation makes added weight of unit bearable.

Corvette interior is well appointed, with leg room for the six-footers. Wrap-around windshield makes getting in and out a bit awkward.

at the bottom of the dash, even if you can take your eyes from the road long enough to find them. The speedometer is well-placed, but quick correlation between the numerals and the divisions is impossible, as they are on different planes. Dial lighting is very good, with rheostat control, and the interior lights are perfect for rallying, being placed under the cowl.

Other interior shortcomings are the dearth of storage space, save for the between-seat compartment, and a conflict between the heater and the passenger's feet. The view forward is very impressive, and clever psychologically. The hood bulges, long fender lines, and cowl vents (which, incidentally, can easily be made functional for dry climates) combine to give an impression of great forcefulness. Vision over this snout is adequate, but not outstanding. The heater and defroster are well up to their jobs, and the only other irritant might be a very awkward and stiff interior door control.

In spite of numerous open car details, the passengers can be kept warm and dry, and can set their own climate at a literal touch of a button. I can imagine no greater contrast than between this and the forced exposure of the gutty old J2 Cadillac Allard, but the fact is that such an Allard in stock trim would be left behind at the quarter by this incredible Corvette! The figures speak eloquently for themselves, and with the lower 3.55:1 ratio things should happen even more rapidly. As a matter of fact, our speedometer was so very slow that it probably was geared for use with that ratio. Also, the engine was nothing like wound out at the top end, and the lower gearing would probably improve top speed by five to seven miles per hour.

(Continued on page 55)

fast figures

By KEN KINCAID

An important part of SCI's new policy is to satisfy the mental appetite of fans whose interest in sports cars goes beyond their good looks and nimble performance. We will describe the world's most exciting cars *in depth,* not just telling what they're like and what they do, but how, why and how well they do it. Furthermore, we'll put in your hands as many tools and techniques for evaluation and comparison as we can.

Here we offer 15 fundamental automotive calculations. Some of them will enable you to pre-test modifications you may be considering for your car. Others will give you a sound basis for armchair road-testing. Still others will provide techniques for actual full-scale road-testing. All of them will be of permanent reference value to the experienced fan, and for novice-class readers they will be an introduction to some of the most important subtleties of sports-car literature.

displacement

This specification is also known as piston displacement and swept volume by the pistons in their up-down course. It's easy to calculate, but ordinarily you don't need to — bore, stroke and displacement are part of any car's vital statistics and even a car salesman is likely to know them. But the picture changes when you get a rebore.

Let's say you have a Triumph TR2 and that the time has come for a bore job, in the course of which fifty-thousandths (.050) of an inch is cut from the cylinder walls. The original bore was 3.27 inches, the stroke 3.62 inches, and the displacement 121.5 cubic inches, or 1,991 cc. It's useful, particularly when displacement-class competition is involved, to know exactly how much difference the fifty-thousandths makes.

The displacement formula is "bore times bore times stroke times .7854 (¼pi) times the number of cylinders." Our TR2's bore has been increased to 3.32 inches. Therefore,

$$3.32 \times 3.32 \times 3.62 \times .7854 \times 4 = 125.4 \text{ cubic inches.}$$

The new displacement translates to 2,055 cc in metric terms, enough to put you well out of two-liter competition. Of course the increase in displacement brought about by a rebore is even more striking when more cylinders are involved.

compression ratio

This figure is invariably given in factory specs, but it changes when you get a rebore or have the cylinder head milled. Let's see how it works.

Compression ratio is the proportion of swept volume of a single cylinder to the vacant combustion space — the space that remains when the piston hits the top of the stroke. When the compression ratio is 8.5 to one, the volume of the cylinder is 8.5 times as great as that of the combustion space.

To calculate the new compression ratio after a rebore you first need to know the volume of the combustion space. First, calculate the swept volume of the stock cylinder, before the bore job. To do this you simply divide the stock displacement by the number of the engine's cylinders. For the TR2: $\frac{121.5}{4} = 30.4$ cu. ins. Now, divide this one-cylinder displacement by the original compression ratio, 8.5: $\frac{30.4}{8.5} = 3.58$ cu. ins.

This is the volume of the combustion space, and with this figure

Getting acquainted with your car and its performance is really quite simple. Here are 15 ways to find out just what the new set of wheels will do.

you can now work out the new compression ratio. First find the displacement of the rebored cylinder:

3.32 x 3.32 x 3.62 x .7854 = 31.33 cu. ins.

Divide this figure by the combustion chamber volume:

$$\frac{31.33}{3.58} = 8.76$$

The new compression ratio is 8.76 to one.

Now suppose you want to get still more compression, and you're wondering what would happen if you had .050 of an inch shaved off the cylinder head. This would lop a thin, cylindrical-shaped slice from the combustion space. The volume of this slice can be computed in the same way that we've computed cylinder displacement, using the depth of the slice instead of the stroke:

3.32 x 3.32 x .050 x .7854 = .43 cu. in.

Now subtract this from the combustion space:

$$\begin{array}{r} 3.58 \\ -\ .43 \\ \hline 3.15 \end{array}$$

As before, to calculate the new compression ratio, divide the cylinder displacement by the combustion space:

$$\frac{31.33}{3.15} = 10.0 \text{ to one.}$$

Using these calculations you can eliminate much guesswork from the pleasurable pastime of engine souping.

piston speed

Because the rate at which the pistons charge up and down the cylinders tends to determine the point at which an engine coughs its innards, this is an extremely important figure. Quality of materials and workmanship can offset its not-entirely inexorable toll. But manufacturers of passenger cars like to stay below 2,500 feet per minute and those who build racing cars shrink from the 4,000 fpm figure. At this point the pistons' friction losses allegedly begin to match the engine's power output. But whatever the controversial facts may be, fast piston speed and fast engine wear undeniably go hand in hand. When judging engines and modifying them it's well to watch piston speed closely. You calculate it simply, by multiplying the stroke (in feet) times 2, times rpm.

In the case of the TR2, piston speed at maximum horsepower would be

.30 x 2 x 4800 (rpm) = 2880 fpm,

a very reasonable speed for a high-output engine.

bore-stroke ratio

Very likely you've heard, or will hear, plenty of talk about this subject. You may have noticed the recent trend toward the "square" ratio, one where the width of the bore and the length of the stroke are equal, and the "over-square" ratio, which means a bigger bore than stroke. The snowballing prevalence of the big-bore school of engine design is related to rpm, and to the fact the faster you rev an engine the more its piston speed and internal friction rise. Sports car engineers are not overly concerned with bearing speeds, which are seldom critical. But they are concerned with piston speeds. And long strokes increase piston speeds. The closer you approach "squareness" — the shorter the stroke — the more you can rev an engine without putting an unduly heavy load on its reciprocating or up-and-down parts.

To calculate bore-stroke ratio you simply divide the stroke by the bore. In the case of the TR2:

$$\frac{3.62}{3.27} = 1.11$$ — very slightly under-square.

transmission ratio vs. overall ratio

British specifications generally express all gear ratios in "overall" terms. In other words, all the transmission ratios are expressed as multiples of the rear-axle ratio. In the U.S., on the other hand, transmission ratios are nearly always listed "pure" — without reference to the rear axle ratio.

To translate an overall ratio into a simple ratio you divide it by the final drive, the rear-axle ratio. For example, the TR2's third gear has an overall, British-type ratio of 4.90 to one. Divide this by the rear axle ratio of 3.70, for a simple, U.S.-type third-cog transmission ratio of 1.32. To convert a simple transmission ratio to an overall ratio, multiply the transmission ratio by the gearbox ratio. Since top cog almost always has a one-to-one ratio, overall "top" in the gearbox is usually exactly equal to the rear axle ratio.

Occasionally in overseas literature you'll come across gear ratios expressed, as, for example, "9/44." Here the 9 refers to the number of teeth on the small pinion gear, 44 to the number on the large ring gear. Dividing 44 by 9 gives the ratio — 4.9 to one.

tire revolutions per mile

This is a particularly useful figure if you want to work out top speeds available in various gears. The Tire & Rim Association has worked out a very neat formula for making this calculation:

$$\frac{10084}{\text{loaded radius in inches.}}$$

When the TR2 is standing on its tires the measurement from hub to pavement — its loaded radius — is 13.0 inches.

$$\frac{10084}{13} = 776\text{, the number of times the wheels rotate in a mile.}$$

speeds in the gears

Now that we've determined the tire revolution figure we can find out the speeds in the various gears at any engine rpm figure. Let's discover what top speed ought to be in the TR2's third gear. The formula is

$$\frac{\text{rpm x 60}}{\text{gear ratio x tire revs}}$$

The TR2's peak hp is developed at 4800 rpm, its overall third gear ratio is 4.9 to one. Therefore:

$$\frac{4800 \text{ x } 60}{4.9 \text{ x } 776} = 75.8\text{ mph, top speed third gear.}$$

In this way you can determine performance on each of the gears. This is particularly valuable to know when you're considering the installation of non-standard gears in the transmission or in the rear axle.

the quarter mile

A measured quarter mile is a handy tool for the performance-minded enthusiast. Arm yourself with a 100-foot steel tape and find a quiet, level section of road that is long enough to give you plenty of shut-off room at each end of the measured distance. The tenth-mile rotor on your car's odometer or mileage counter is useful for making rough preliminary surveys. Once you've picked your spot, measure off the 1,320 feet carefully, marking with chalk or lumber crayon each 100-foot "step." Mark each end of your test strip with some permanent marker. Stakes at each side of the road, spikes driven into the pavement, and paint marks on the pavement are all good. Before you run tests put up markers that can be seen from a distance of a few hundred feet. You can use flags, piles of rocks, or even stacks of the ubiquitous beer can.

bhp per cubic inch

This calculation is one way of relating power to unit of displacement, and it's very handy when you're comparing engines that are very similar in design. But you should use it with caution and remember that design differences can make it worthless as an index of a car's efficiency. For example, if a given engine's stroke is cut in half and its rpm is doubled, its power output will remain the same while the bhp per cubic inch figure will be doubled.

To determine bhp per cubic inch, divide the horsepower by the displacement in cubic inches. For the TR2:

$$\frac{\text{90 bhp}}{\text{121.5 cu. ins.}} = .74\text{ bhp per cubic inch.}$$

tire revolutions per mile

This is a particularly useful figure if you want to work out top speeds available in various gears. The Tire & Rim Association has worked out a very neat formula for making this calculation:

$$\frac{10084}{\text{loaded radius in inches.}}$$

When the TR2 is standing on its tires the measurement from hub to pavement — its loaded radius — is 13.0 inches.

$$\frac{10084}{13} = 776\text{, the number of times the wheels rotate in a mile.}$$

speedometer calibration

Few speedometers are even reasonably accurate. Their error is almost always optimistic and it grows with the speed. However, they are easily corrected if you have a measured quarter-mile available. All you need to do to convert elapsed time over the quarter-mile into mph is to divide the time in seconds into 900. Let's say you're running a check through the quarter with your speedometer held at a steady 60 mph, indicated. You start your stopwatch as you cross the first marker and stop it as you cross the final one. The elapsed time is, say, 15.50 seconds.

$$\frac{900}{15.50} = 58.06 \text{ mph, actual speed}$$

top speed standing quarter-mile

The measured quarter-mile is useful for top-speed tests, using the same basis for calculation. Let's say you take a generous running start in a TR2 and cover the quarter-mile timing strip in 9.35 seconds. Divide 900 by this number and you have a top speed of 96.25 mph.

You can also use the measured course as a private drag strip, recording elapsed times for the standing-start quarter mile. Such elapsed times (standard in all road tests) furnish an enlightening basis for comparison with the performance of other cars. You can get the most accurate results by averaging two-way runs.

determining unknown gear ratios

Usually there's no question about the gear ratios of the car you're driving. They're pinned down in the factory specs, or the owner's manual. But every now and then the time comes when you find yourself in a machine whose exact final drive ratio is unknown. If you have an honest-to-God clutch instead of some variety of hydraulic coupling, you can figure it out without the bother of dismantling the rear end.

This is the procedure. You jack up one rear wheel, clear off the ground. Remove the spark plugs, to ease the job of turning the engine over. Make a chalk mark on the crankshaft fan belt pulley or vibration damper and a matching mark on the engine block. Drop the gearbox into top cog and make a clear chalk mark on the ground-free rear tire, and a corresponding mark on the road. Now the setup is complete.

While a helper keeps his eye on the crankshaft fan belt pulley or vibration damper, turn the free rear wheel. In the case of the TR2, when the wheel has made a full round the pulley will have gone around 3.7 times — and that's the final drive ratio. Repeating the operation in the other, intermediate gear positions will give you the other overall ratios. To get the simple, unadulterated gearbox ratios, divide these by the final drive ratio. And then you'll know your gearbox.

speeds in the gears

Now that we've determined the tire revolution figure we can find out the speeds in the various gears at any engine rpm figure. Let's discover what top speed ought to be in the TR2's third gear. The formula is $\frac{\text{rpm x 60}}{\text{gear ratio x tire revs}}$ The TR2's peak hp is developed at 4800 rpm, its overall third gear ratio is 4.9 to one. Therefore:

$$\frac{4800 \times 60}{4.9 \times 776} = 75.8 \text{ mph, top speed third gear.}$$

In this way you can determine performance on each of the gears. This is particularly valuable to know when you're considering the installation of non-standard gears in the transmission or in the rear axle.

mph per 1,000 rpm

This is another, even simpler way to compute miles per hour for any engine speed in any gear. The formula is three times the loaded tire diameter divided by the overall gear ratio equals mph per 1000 rpm. To illustrate, let's find the TR2's speed in second gear at peak engine revs. Its overall second gear ratio is 7.40, its loaded tire diameter is twice its loaded tire radius, or 26. Thus:

$$\frac{3 \times 26}{7.4} = 10.54 \text{ mph per 1000 rpm.}$$

The car's peak power is developed at 4800 rpm, so multiplying 10.54 by 4.8 gives a top speed in second gear of 50.6 mph — a pretty accurate figure. #

When it comes to a fast, flat circuit the D-Type Jaguar is the car to beat. On tight U.S. circuits, modifications are in order. Here is the story.

SCI Technical Report:

the

AFTER its postwar resumption in 1949, the 24-hour race at Le Mans has grown in stature annually, and among the first to realize its great publicity value was Jaguar Cars, Ltd. The fast-growing English firm has fielded by far the most successful team at Le Mans since the war, having won every other year since 1951. All their efforts have been concentrated on this classic, and entries in other races have been at best token efforts. Naturally and without question, the Jaguar competition cars are "Le Mans cars," perfectly suited to the fast, flat Sarthe circuit.

Though restricted in its original intent to the Le Mans type circuits, the D-Type Jag has been proven to be a car to beat on many courses. Production versions are now being distributed to individuals and racing stables, and certain faults are coming to light and being corrected, as we will see here.

From the body design standpoint, Reid Railton's 1938 design for the late John Cobb's land speed record car is the initial inspiration for the D-Type. Railton knew that many very fast cars were particularly sensitive to side winds at speed, and that designers had tried to move the center of

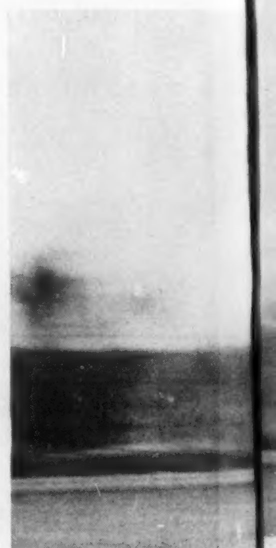
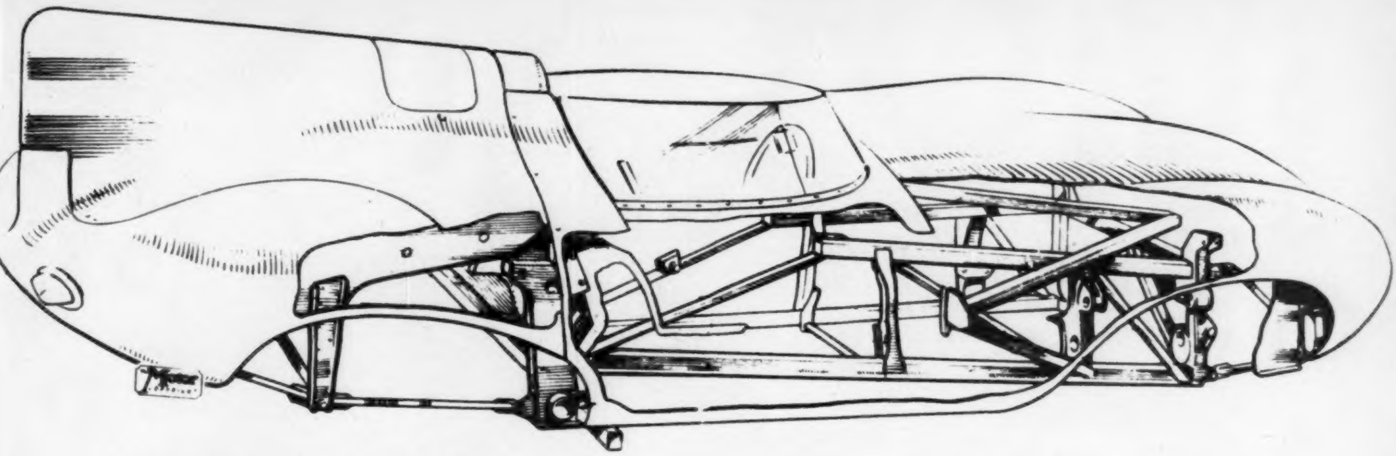


Photo by Dan Rubin

By KARL LUDVIGSEN

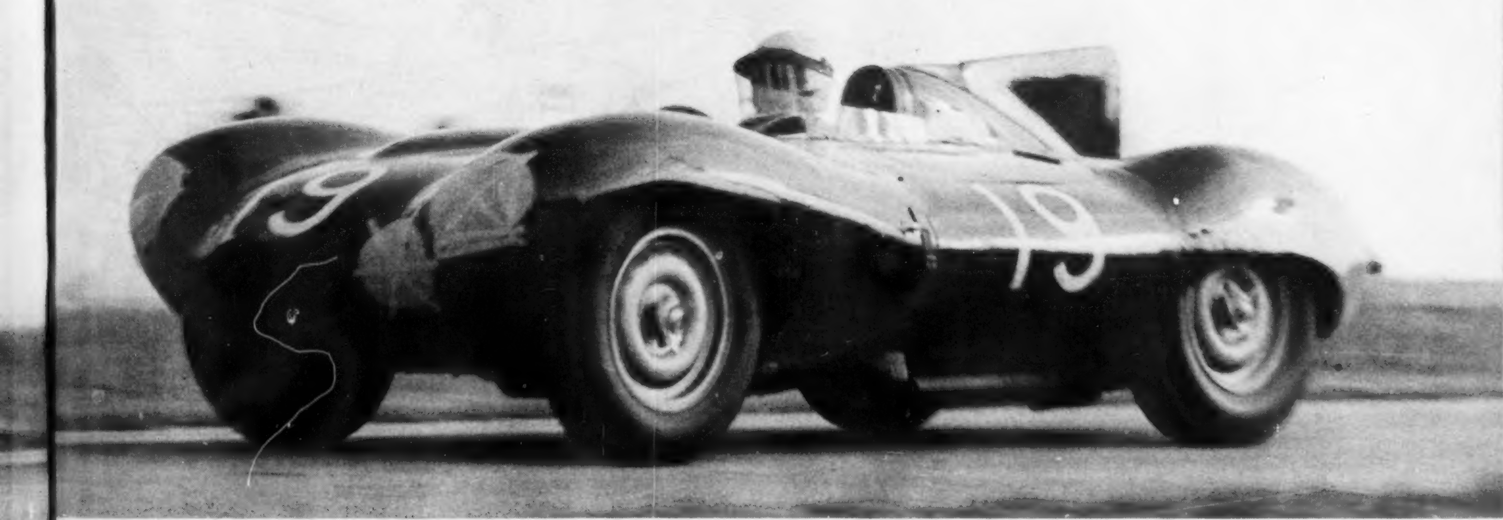
Balanced by bolt-on weights, the alloy wheels are reinforced by steel center sections. Dunlop-made wheels, tires and brakes are shrouded by contoured fender.



Steel is used for the production D-Type frame, which can be detached from the cockpit unit.

Drawing courtesy The Motor, England

hottest jaguar



pressure back by using fins. These early cars, though, were slab-sided as barns, and presented a lot of resistance to a lateral breeze. Railton took the cue and came up with a car that was aerodynamically clean from *all* directions, and sat flat at 400 mph with no finning.

In the U.S., Lee Chapel and Harold Post followed up with similar contours for Bonneville streamliners; another internationally significant design was the "Disco Volante," produced by collaboration between Alfa Romeo and Touring. These startling cars were introduced in June of 1952, and produced much more publicity than race wins. Jaguar saw the light, though, and by June of 1953 they had a prototype body ready for the C-Type that embodied the same basic streamlined ovoid-form-plus-wheel-bulges that the above cars had, and was clearly the daddy of the D.

Jag raced the older C body at Le Mans in '53, but they took the prototype C to the Jabbeke Highway in October of that year, and cranked it up to 178.383 mph with a basic M-Type engine. Development continued, and early May of 1954 found that C prototype (now fuel-injected) and a brand-new D Type on trial at Le Mans. Rolt circulated in the unpainted D some 2¼ mph faster than Ascari's 1953 4.5 Ferrari record, but at the end of the race itself he and Hamilton were 2.54 miles down on the rapid new 4.9 Ferrari. A later win in the Rheims 12-Hour made up for this.

The 1954 D-Types were true prototypes, and differed from the present production D in several respects. After a review of these differences, we can get on to a study of the present production car.

Frame construction was the main variation. Then, as now, the central cockpit was an oval-sectioned monocoque

SPECIFICATIONS
D-TYPE JAGUAR

PRICE .... $10,000 (out the door, incl. tax and license)

ENGINE

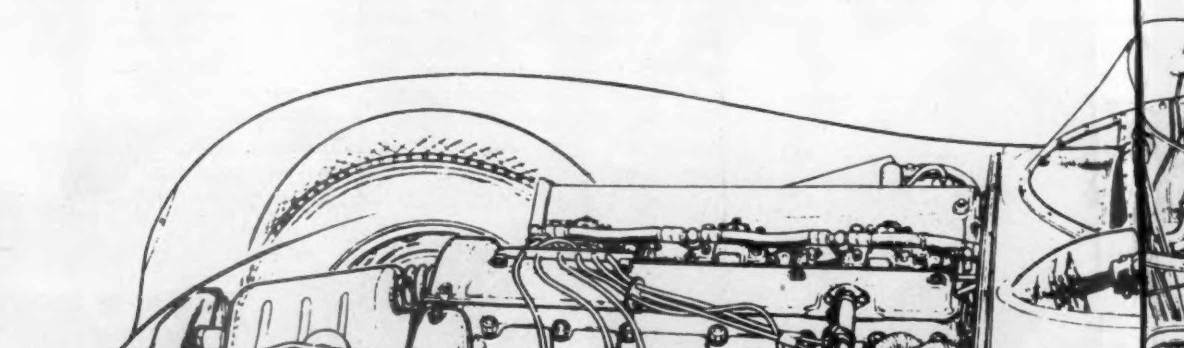
Cylinders	6, in line	
Bore and stroke	3.27 in x 4.12 in (83 mm x 106 mm)	
Capacity	210 cu in (3442 cc)	
Piston area	50.4 sq ins	
Firing order	1, 5, 3, 6, 2, 4 (1 at rear)	
Compression ratio	9 to 1	
Output	*Production*	*Le Mans*
Max. horsepower	250 @ 6000	285 @ 5750
Max. torque	242 @ 4000	264 @ 5500
Max. b.m.e.p.	174 psi	190 psi
Valves	*Inlet*	*Exhaust*
Head dia.	1⅞"	1⅝"
Stem dia.	5/16"	5/16"
Seat angle	30°	45°
Clearance	.006-.008	.010-.012
Carburetors	3 Weber 45 DC03	
Ignition		
Breaker gap	.012-.014	
Timing	8° BTDC	
Plugs		
Road	Champion NA8	
Racing	Champion NA10	
Gap	.022	
Oil capacity	33½ pints	
Water Capacity	34¾ pints	

CLUTCH .... Borg and Beck 7½" dia. triple plate

GEARBOX

Ratios	
4th	1 : 1
3rd	1.28 : 1
2nd	1.645 : 1
1st	2.144 : 1
Rev	2.194 : 1
Oil capacity	3 pints

REAR AXLE	2.93	3.31	3.54	3.92
Speeds in gears				
4th	169	146	138	125



THE D TYPE JAGUAR

SPECIFICATIONS
D-TYPE JAGUAR

3rd	130	115	108	95
2nd	102	90	84	75
1st	77	68	67	58

1955 Le Mans ratio ... 2.53
Other available ratios ... 2.79, 4.09, 4.27, 4.55
Oil capacity ... 4½ pints

WHEELS ... 16 x 5½K Dunlop light alloy disc

TIRES

	Front	*Rear*
Up to 140 mph	600 x 16, 32 psi	650 x 16, 35 psi
150 to 170 mph	650 x 16, 45 psi	650 x 16, 50 psi

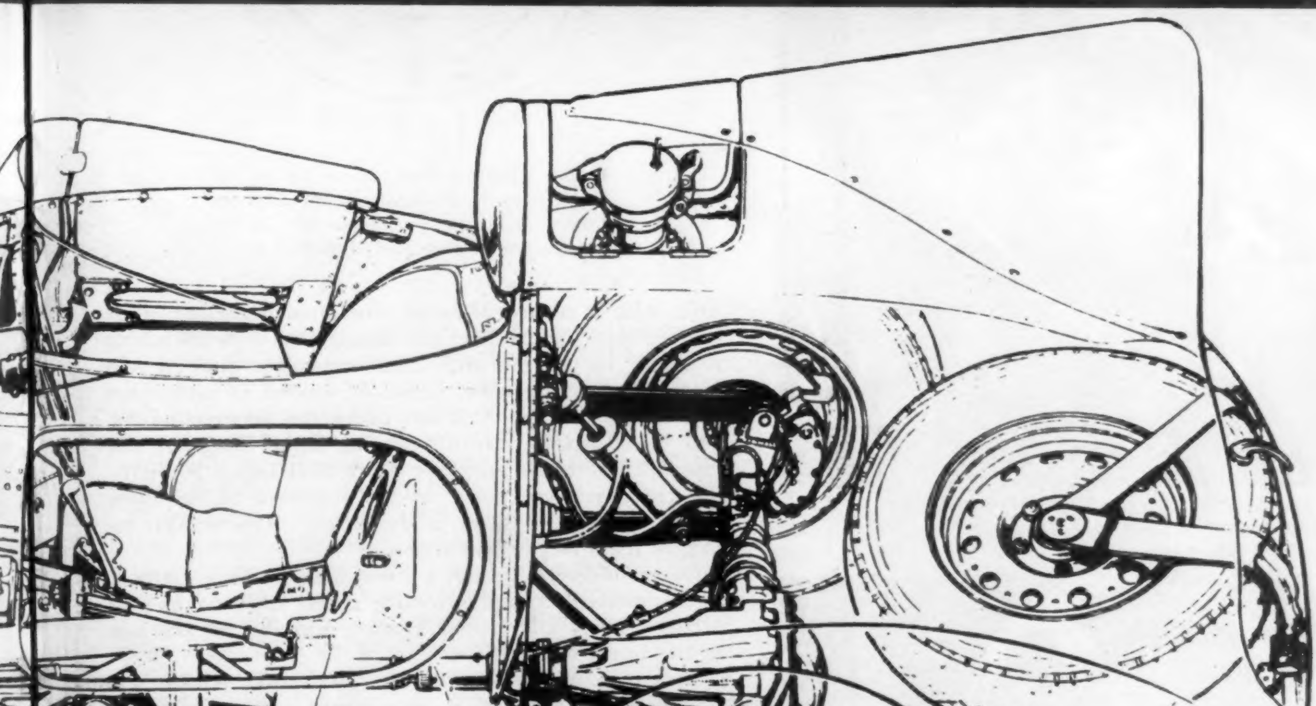
BRAKES
Disc dia. ... 12¾ ins.
Pad dia. ... 2 3/16 ins.
Lining area
Front ... 45 sq in.
Rear ... 30 sq in.

STEERING
Type ... Rack and 8-tooth pinion
Turns lock to lock ... 1¾
Turning circle ... 35 ft
Steering wheel ... 16 in dia. light alloy

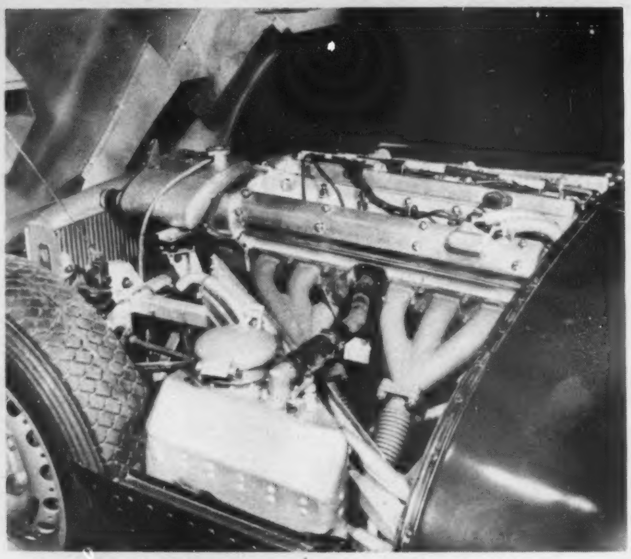
SUSPENSION
Overall rate, front and rear ... 120 lb/in
Shock absorbers ... Girling CDR 4½ tubular

CHASSIS
Wheelbase ... 90⅝ ins
Front track ... 50 ins
Rear track ... 48 ins
Toe in ... 0-1/16 in
Caster ... 3½° ± ¼°
Camber ... 1¾° ± ¼°

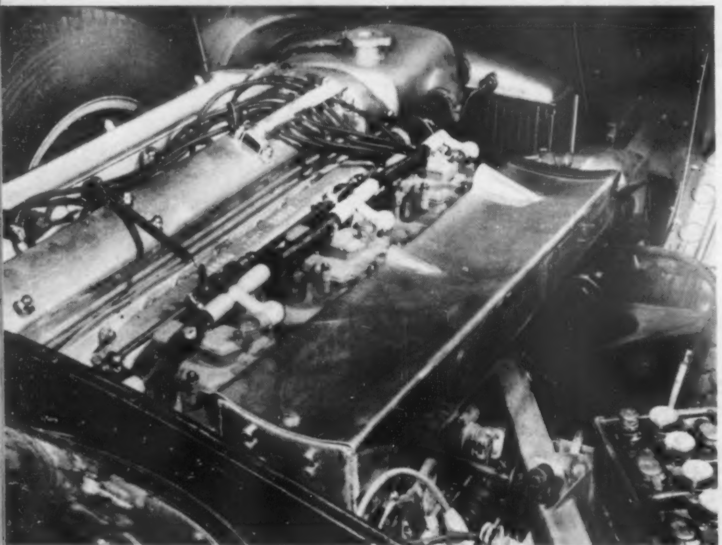
OVERALL
Length ... 154 ins
Width ... 65⅜ ins
Cowl height ... 32 ins
Fin height ... 45 ins
Ground clearance ... 5¼ ins
Frontal area ... 10.85 sq ft
Fuel capacity ... 43¾ gal
Dry weight ... approx. 1940 lb



Courtesy of Autocar COPYRIGHT

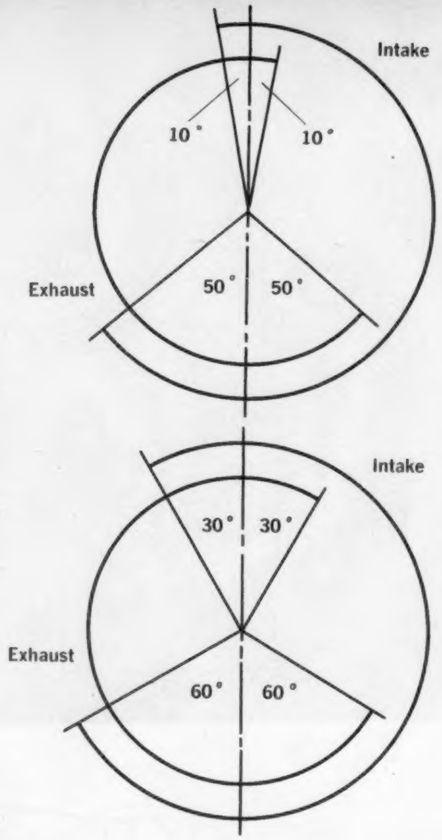


Crankcase breather, ducted to oil tank, is shielded from exhaust heat. Wiring and other breathers have flexible armor.



Engine inclination was necessary to provide room for carburetors and cold air box. Weber carbs receive fuel in series.

Production cockpit has more elbow room, thanks to frame changes. Horn button is at right of wood-rimmed wheel, "glove box."



Upper diagram shows valve timing for stock Jaguar; duration is 240 degrees. Lower diagram illustrates the hotter timing and 270 degree duration of D.

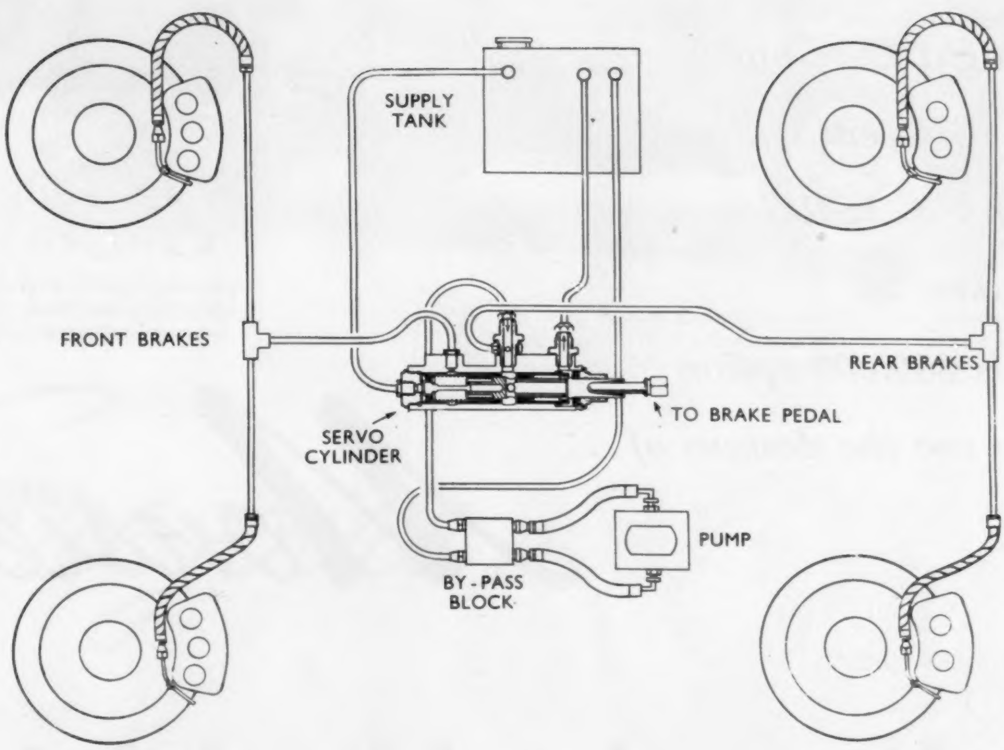
unit, with a riveted 18-gauge aluminum-magnesium alloy stressed skin. In the 1954 car, though, the forward tubing structure for engine and front suspension support was made of a similar alloy, argon arc-welded to each other and to the cockpit. This was costly and time-consuming, and made repairs very difficult, as Colin Chapman also discovered with his prototype Mark VIII Lotus. Similarly, the radiators were borne by an extension of the main frame, and certain tubes in the center of the cockpit restricted the driver's elbow action.

Other differences include a non-synchromesh-low gearbox, an unnecessarily complex cooling system header tank and pressure valve, and lateral locating arms bolted and not welded to the rear axle tubes.

By the approach of 1955, the production version was taking shape, but not by any means soon enough for Briggs Cunningham to have one at Sebring in March. Walters and Hawthorn drove a 1954 factory car there, as did Duncan Hamilton in many European events. Le Mans 1955 saw the first production cars in action, but with certain additional prototype modifications. One of these cars duly won the race, but under admittedly inconclusive circumstances, while Hawthorn drove lone entries at Aintree and the Tourist Trophy.

For the main discussion, then, I will deal first with the production D-Type as available to the public, and afterwards take up both the factory Le Mans changes and the Cunningham car which Sherwood Johnston drove so well in 1955.

In spite of substantial changes, the chassis-body structure is still by far the most unusual feature of the D Jaguar.



The central oval cockpit section has holes in the top for the driver and the passenger hatch, and has full bulkheads at front and rear. These are pierced only by the driveshaft in the rear, and the gearbox and driver's feet in the front. Inverted L-shaped boxes are riveted low on each side of the interior, adding greatly to the stiffness of this very light fully-stressed cockpit.

The prototype alloy tubing has given way to 18 and 20 gauge square-section steel tubing, brazed together. This new subframe weighed slightly less than the original, thanks largely to considerable simplification in the cockpit region. Flanged on the bottom to support the floor, the two main tubes sprout from the driveshaft hole in the rear bulkhead and diverge to the lower front suspension mounts. Starting from the same rear point, the upper tubes rise sharply in small section to the front bulkhead, where they enlarge, level out, and diverge similarly to the upper front wishbone mounts. Vertical and lateral bracing at this point unites and stiffens the front end, while two additional large tubes begin at the maximum width of the front bulkhead and converge to a point just behind the radiators. A detachable frame of circular-section tubes carries the oil and water radiators and the hood pivots, while the tubular frame as a whole is merely bolted to the stressed cockpit at the front and rear bulkheads and along the floor, greatly easing repairs.

Four main bolts and an additional series across the top suspend the riveted alloy tail from the rear bulkhead. The tail must support only its own weight and that of the spare

(Continued on page 56)

Brakes on Cunningham D-Type have wheel scoops in addition to nose ducting. Wishbones are forged.

The story of the Kaiser might have had a different ending had its builder taken up his $60,000 option to use the designs of . . .

Monsieur Gregoire, engineering genius of the Gregoire Sport, going over the schematic of his latest sports model.

Monsieur

and the

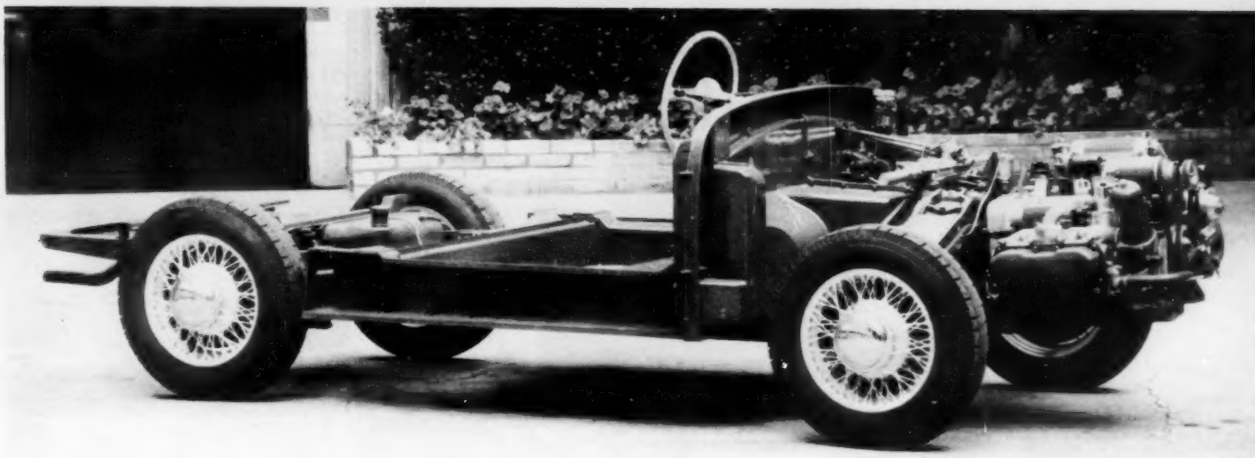
By ALEX JORDAN

The Gregoire, unassuming in appearance, can probably outmaneuver many sports machines.

EVEN when their ideas run pretty close together, a German and a Frenchman are sure to approach a problem from opposite angles. Thus while the late Ferdinand Porsche and Jean Albert Gregoire were both convinced that the engine should be at the same end of the car as the wheels it drives, they differed in their choice of position. A car having only two ends, the choice was perhaps not very wide. Porsche put his engine in the back and Gregoire out in front — both engines flat fours, for reasons of space saving and lightness.

The Gregoire name is no stranger to U. S. automotive circles. Early in 1946 the use of aluminum in the peppery Frenchman's designs attracted the attention of Henry J. Kaiser, then in the process of trying to crash the automobile market. As a large aluminum producer, Kaiser was on the lookout for new outlets for the metal as well as being eager to start building cars to fill the postwar shortage. He had a Gregoire car shipped to California and invited its designer to come along to discuss the possibility of a new American car built around the Gregoire designs. The upshot was that Kaiser paid $60,000 for an option on the Gregoire design. He failed to pick it up and the car that was finally built is now past history. How it would have ended had Kaiser used the then radically new design is a matter for speculation, but only over the third beer — or the fourth.

The latest Gregoire model, the "Gregoire Sport," exhibited recently at the Ford Museum in Detroit and at the



Chassis and engine wait for body outside Gregoire shop. Wire wheels add to lightness of completed machine. Note simplicity of frame — no X braces are needed.

Gregoire

wheels that pull

ALCOA headquarters in Pittsburgh, is the culmination of thirty years of automobile design and shows what the Kaiser might have been. It incorporates the three principal Gregoire inventions, the Tracta homokinetic joint for the front wheel drive, the variable rate suspension and the die-cast light metal chassis frame.

Each of these devices has behind it a long history of development. In 1926 Gregoire, then a young man, decided to enter the 24 hours race at Le Mans with a car of his own design. It was the so-called Tracta because its front wheels pulled the car behind them, instead of pushing it from behind.

Most of the previous front-wheel drive cars used ordinary universal joints. The variation in power transmission through such joints is insignificant when the angle is small, but increases alarmingly when the two shafts are at a sharper angle. Since the front wheels must have a wide angle of movement for steering purposes, the use of standard universals for this purpose is unsatisfactory.

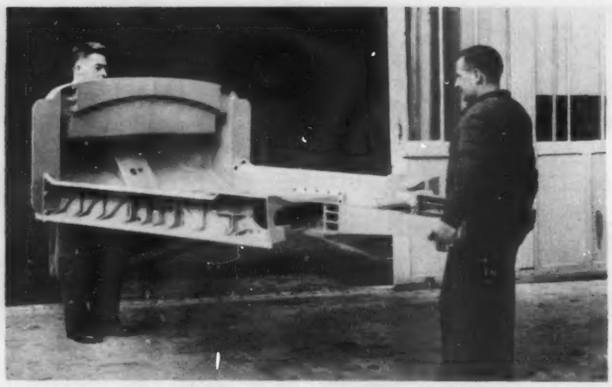
The Tracta joint, designed by Gregoire and Fenaille, is described as "homokinetic" which is the Greek way of saying that motion is transmitted uniformly and smoothly, regardless of the angle between the driving and the driven shaft.

In the 24 hours of Le Mans, in 1927, there were 29 starters and only seven cars at the finish. One of them was the front wheel drive Tracta, driven by Gregoire himself. He competed for three successive years, chalking up a remarkable reliability record. Out of nine Tractas entered in four Le Mans races, eight were seen at the finish. No other make has ever equalled that percentage. The Tractas could not hope to win, because they were light, somewhat underpowered cars with a top speed of about 95 mph — which was quite good for those days, but not enough to beat the huge Bentleys and the Alfas.

The reliability record, however, was important, for it established beyond dispute the value of the front wheel drive with Tracta joints. Opponents of front wheel drive claimed that it could never be reliable. But when his own engineers argued this point with Andre Citroen, the French motor tycoon replied: "Anything that can last the 24 hours at Le Mans is good enough for my cars."

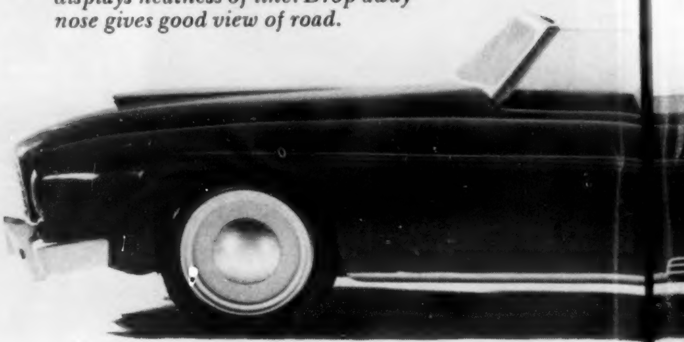
Although the front wheel drive Citroens, starting with 1934, did not use the Tracta joint, the decision to adopt the f.w.d. principle was certainly influenced by the Gregoire reliability record at Le Mans.

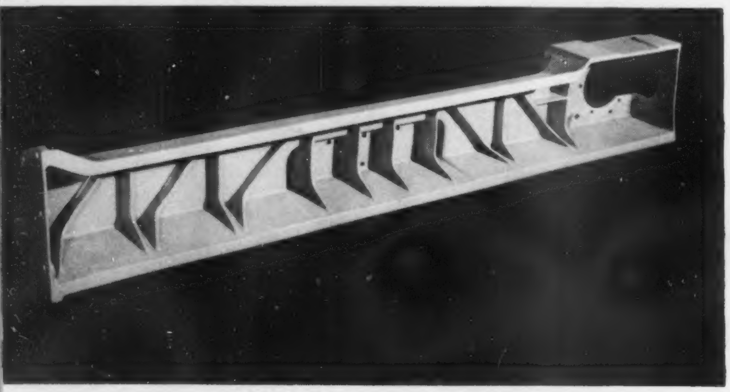
In the meantime the German D.K.W. had used the Tracta joint since 1929, and the Adler since 1931. The British Bendix Corporation built Tracta-type joints during World War II for about 600,000 military vehicles — four



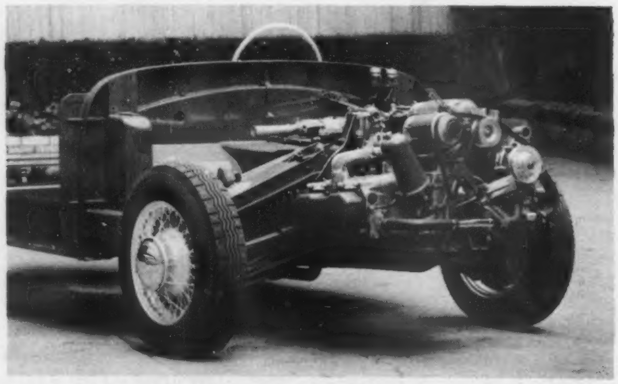
Two men carry die-cast light metal frame with no strain. Light components give car its excellent mileage even at high speed.

Scale model of Gregoire Sport machine displays neatness of line. Drop-away nose gives good view of road.





Section of frame shows vertical and diagonal rigid supports which strengthen light alloy beam. Note depth of frame rail.



The flat-four water cooled engine sits forward of the driving front wheels. Weight helps give car excellent balance. Radiator has been removed for better view of engine.

wheel drive trucks and armored cars. In the U. S. A. they were made, on license, by the New Process Gear Corp. of Syracuse, N. Y. for jeeps and other military vehicles.

Among current models the Dyna Panhard and the Hotchkiss-Gregoire both use the Tracta joint for their front wheel drive units. Thus the adoption of the front wheel drive – used by 25 percent of all French cars – owes a great deal to the pioneering work of Gregoire in the twenties.

The story of the variable suspension is more recent. In 1941 Gregoire designed a light car for the French Aluminum Company – naturally front wheel drive – with a light metal cast chassis and an air-cooled engine. The car weighed only 1000 lbs., but was designed to carry four persons. Thus the total weight of car and passengers might in some circumstances be double the dry weight of the car. This posed a tough suspension problem: springs stiff enough for the full load would be very hard when only one person was riding; spring soft enough for the empty car would not support the full load. A variable suspension was the answer. Its principle is very simple: a helical spring in tension, so positioned in the suspension system that under light load the pull on it is negligible, increasing with the deflection under load. This system can be used on its own, or as an auxiliary to a more conventional suspension – as for example on the Hotchkiss-Gregoire. The positioning of the spring and its points of attachment are determined by a mathematical formula calculated to give progressive tension, variable according to the load.

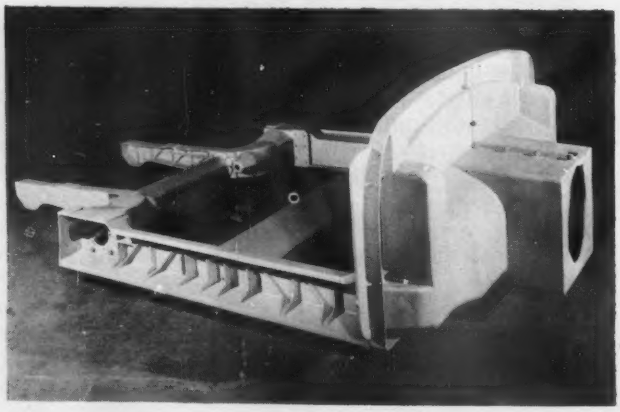
It is thus possible to have very soft springing in a lightly loaded car, without the penalty of mushiness under load. This feature is particularly valuable in a sports car in which the general tendency is toward excessively hard springing.

The third Gregoire principle – the chassis frame built of light metal castings – was originated in 1935. A competition for a light car design was held in France. Gregoire submitted a small car with a chassis-body shell of cast aluminum, front wheel drive and a two-cylinder air-cooled engine. The car was made in small numbers by the French Aluminum Co.

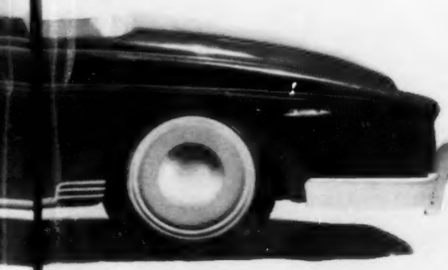
In 1937 the light-metal chassis principle was used in the Gregoire designed Amilcar Compound, a model which was the sensation of that year's Motor Show in Paris.

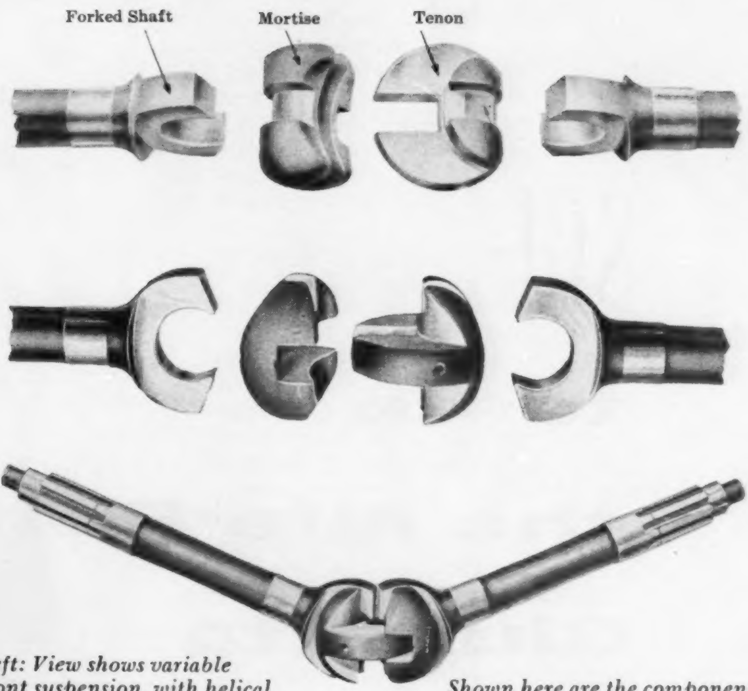
In the 1956 Gregoire Sport the chassis frame is made of die-cast aluminum parts bolted together. Lighter than a steel frame, it is also stiffer, owing to the much greater depth of the girders. For small and medium production runs – which are the rule in Europe – this type of frame

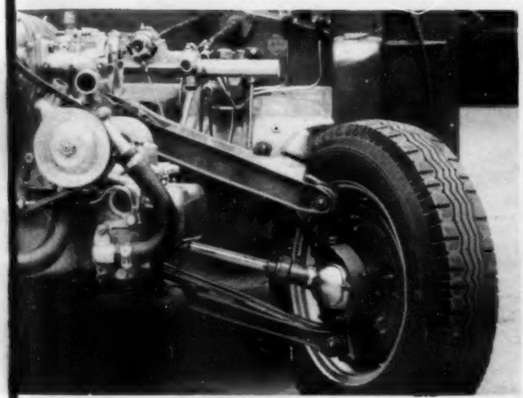
(Continued on page 59)



Almost abstract in design, frame looks like weird futuristic girder. For its light weight, frame is rugged and sturdy, withstands stresses of hard driving.

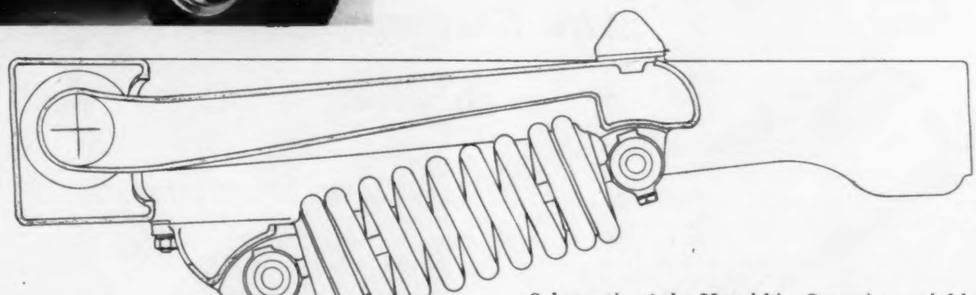






Left: View shows variable front suspension, with helical spring in tension, and front wheel drive unit. Upward arm movement causes spring to stretch, thus compensating for different loads.

Shown here are the components of the Tracta homokinetic joint for the front wheel drive. Bearing surface tolerances are critically machined for minimized friction in power transmission.



Schematic of the Hotchkiss-Gregoire variable suspension spring. Unit allows for constant springing under loaded and unloaded conditions.

SPECIFICATIONS
GREGOIRE SPORT

CHASSIS

Wheelbase .... 94.5″
Front Track .... 56.8″
Rear Track .... 52″
Overall Length .... 177″
Overall Width .... 69″
Height (without windshield) .... 35.4″
Tires .... Michelin 185 x 400 mm
Turning Circle Radius .... 13 feet

ENGINE

Cylinders .... 4 opposed
Bore and Stroke .... 3.54 in. by 3.38 in.
Displacement .... 133.51 cu. inches
Compression ratio 6.9
Solex twin barrel carbureter
Horsepower .... 130 bhp @ 4500 rpm
Cooling .... liquid
Constantin supercharger delivers 5.5 psi boost at 4000.

TRANSMISSION

Four forward speeds (top overdrive) and one reverse.

With a Gleason Spiral bevel drive of 11/30 and standard tires, the road speeds per 1000 rpm are the following:

1st — 7 mph.	3rd — 19.4 mph.
2nd — 15 mph.	4th — 25.6 mph.

reverse 7.83 mph.

LIQUIDS

Cooling System .... 13.73 quarts
Oil .... 6.34 quarts
Gearbox and Differential .... 3.6 quarts
Fuel Tank .... 15.85 gallons

FUEL CONSUMPTION

16.8 mph at an average speed of 65 mph.
SPEED .... 118 mph.
STEERING .... rack and pinion
SUSPENSION .... variable, independent on all wheels by four helical springs working in traction. Four Houdaille hydraulic shock absorbers. Two stabiliser bars.

SCI tests the Alfa Romeo Giulietta

Giulietta accelerating in SCI road test. High torque gives car excellent pulling power in top gear even on long, steep grades.

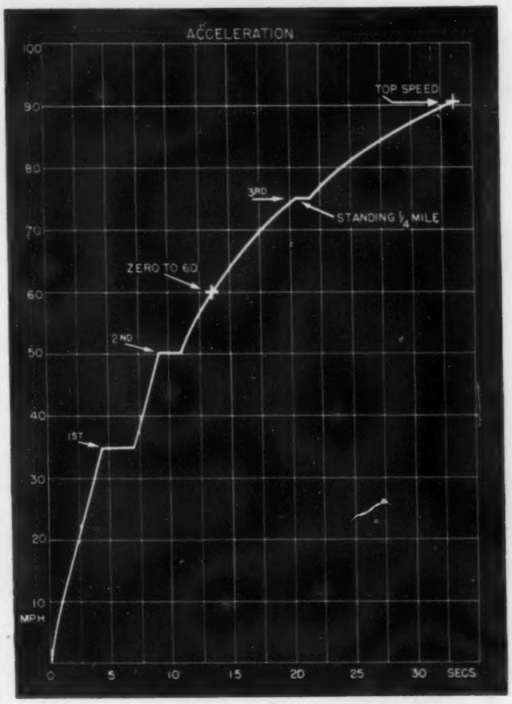
Alfa Giulietta: a champagne car at a beer price.

WHEN the men who run Alfa Romeo named their new 1.3 liter model "Giulietta" – Juliet, in English – they were thinking of character as much as of an obvious play on names. Shakespeare's Juliet was a tender child whose passionate nature belied her demure specifications. Alfa's Giulietta is much the same.

Its dimensions are toy-like. Its displacement and horsepower are minute. Its top speed will give no one gray hairs and the fierceness of its acceleration is as much a matter of chassis feel as it is of gravities or feet per second squared. But the Giulietta is *all* machine and it's one of the most exciting, eagerly responsive cars I've ever driven.

The little Alfa has a vital personality, and it mirrors your own mood. If you're feeling dreamy you can drive it as somnolently as you would a heavy Detroit lugger. But if you are in a mood to *go,* it can turn you on like a jug of adrenalin. I've never driven a safer car. Its brakes, steering and roadholding are sheer perfection. In most cars your chances of worming your way out of a real road emergency depend largely on luck; it's something like riding a loco

The Giulietta displays usual simple Alfa Romeo grille. Tires are Pirelli Cinturato type with unique tread pattern which give car fine adhesive qualities on wet or dry surfaces.



Acceleration chart shows Giulietta's high torque performance. Long horizontal lines at each shift point were due to column shift linkage being out of adjustment. With floor shift, there is no doubt that the car would have reached top speed in about 25 seconds.

PERFORMANCE
ALFA ROMEO GIULIETTA SPYDER SPRINT

TOP SPEED:

Two-way average	90.4 mph
Fastest one-way run (one mile approach to traps)	93.8 mph

ACCELERATION FROM ZERO TO:

20 mph	2.4 secs.
30 mph	3.7 secs.
40 mph	7.7 secs.
50 mph	9.2 secs.
60 mph	13.7 secs.
70 mph	17.5 secs.
80 mph	24.6 secs.
Standing 1/4 mile	20.7 secs.

SHIFT POINTS:

First	35 mph
Second	50 mph
Third	75 mph

SPEEDOMETER CORRECTION:

Approximately 4 mph fast throughout speed range.

FUEL CONSUMPTION:

Hardest possible driving, actual	28 mpg

SPECIFICATIONS

POWER UNIT:

Type	4 cyl., in line
Max. bhp	65 bhp @ 550 rpm
Piston displacement	78 cu. ins. — 1290 cc
Bore x stroke	2.91 x 2.95 ins. — 74 x 75 mm
Bore: Stroke Ratio	1:1.01
Compression Ratio	8.0 to 1
Valve arrangement	Vee-inclined, dohc

DRIVE TRAIN:

Clutch type	Single-plate, dry
Transmission Ratios:	
1st	3.59
2nd	2.10
3rd	1.36
4th	1.00
Final drive ratio	4.55

CHASSIS:

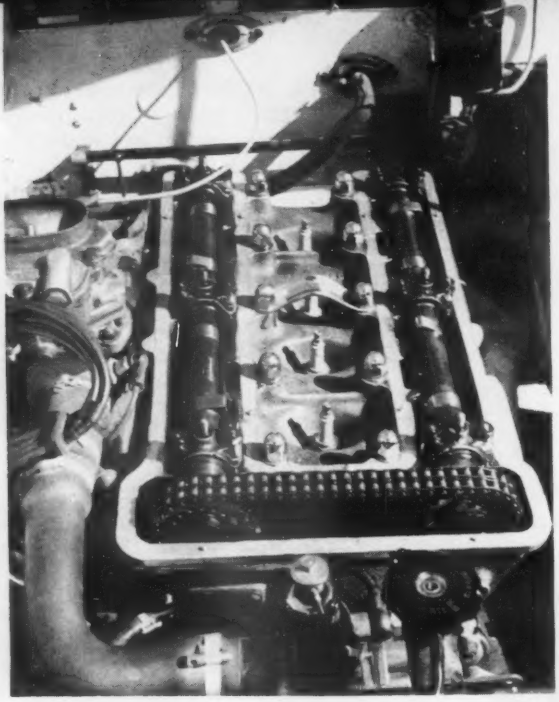
Suspension, front	Inclined coil springs, unequal length wishbones.
Suspension, rear	Solid axle, coil spring, radius rods.
Shock absorbers	Girling tubular, F & R
Steering type	ZF worm and roller
Steering wheel turns	3 from lock to lock
Steering turning diameter	30 ft.
Brake type	Bimetallic drums, 10.5 in. diam. F, 10-in. diam. rear. Two leading shoes at F.
Brake lining area	264 sq. in.
Wheel studs	(15/32") 12 mm, 4½-in. circle diam.
Tire size	15.5 x 15
Rim width	5.75 ins.
Wheelbase	94 ins.
Tread	50 ins., F & R

GENERAL:

Length	156 ins.
Width	60 ins.
Height	50 ins.
Weight, ready to go	1910 lbs.

RATING FACTORS:

Bhp per cu. in.	.834
Bhp per sq. in. piston area	2.45
Piston speed in ft. per. min @ 60 mph	1950 fpm
Piston speed in ft. per min. @ max. bhp	2708 fpm
Brake lining area per ton	293 sq. ins.



Uncovered engine shows dohc set-up and chain drive. Head and block are light alloy. Cylinder liners are wet. Carburetor is two-throat Solex. Acorn nuts holding cover are chrome finished.

Rounding a sharp bend at 40 mph, the small Alfa tenaciously grips road without trace of slide or dip. Author felt Giulietta could take curve at 50 mph nicely. There is no excessive dip at either end of the car. Steering is almost perfectly neutral.

Three quarter front view shows the little Alfa's aerodynamic-type body. High beam is ultra-high, used in lieu of horn in Italy. This may be good for Quiet Week but illegal in U.S.

Profile of new Giulietta. Convertible top folds completely out of sight behind seat backs. Stowing top is no problem for average person because of spring loaded framework.

elephant in a jungle stampede — you can't control him but maybe his beef will get you through. But the Giulietta is like an extension of your nervous system. It responds as quickly as your own reflexes. Although it pretends to be no more than a sports-touring car it gives you that feeling of oneness with the machine that is a quality of the racing thoroughbreds.

This character makes the Giulietta a perfect expression of Alfa Romeo's unique traditions. From the date of its first touring car production, 1910, Alfa has built racing cars. Furthermore, Alfa has always staked its reputation on its racing record — a precarious practice avoided by nearly all car manufacturers. Down through the years, Alfas sold to the public often have been no more than detuned racing cars and nearly every Alfa chassis has been patterned after great and successful racing machinery. The company was one of the most vigorous pioneers of the fine, small-displacement, high-revving engine at a time when nearly all car manufacturers associated quality with lumbering road locomotives. In the Twenties the company faced up to the inherent superiority of the dual overhead camshaft layout and has stuck with it ever since, in spite of its higher cost. And of all high-performance cars, none has a better name for reliability than Alfa.

This is part of the inheritance that is expertly invested in the Giulietta. Cars of comparable quality — the 1750 cc Alfa of the early Thirties, for example — sold for around \$5000 when dollars were tough to come by. But now, for the first time in its history, the company has converted to real mass production and you don't have to be one of the wealthy few to own a pure bred Alfa. The Giulietta comes in three forms. Cheapest is the four-door Berlina at about \$2700, followed by the Spyder Sprint convertible two-seater at \$3200 and the Coupe Sprint at \$4200. All three forms have the same running gear and, except for minor modifications, the same engine.

View shows width of rear brake drum which, in part, accounts for superb braking. Note rubber cushion to damp axle under extreme compression; strap halts rebound.

ENGINE

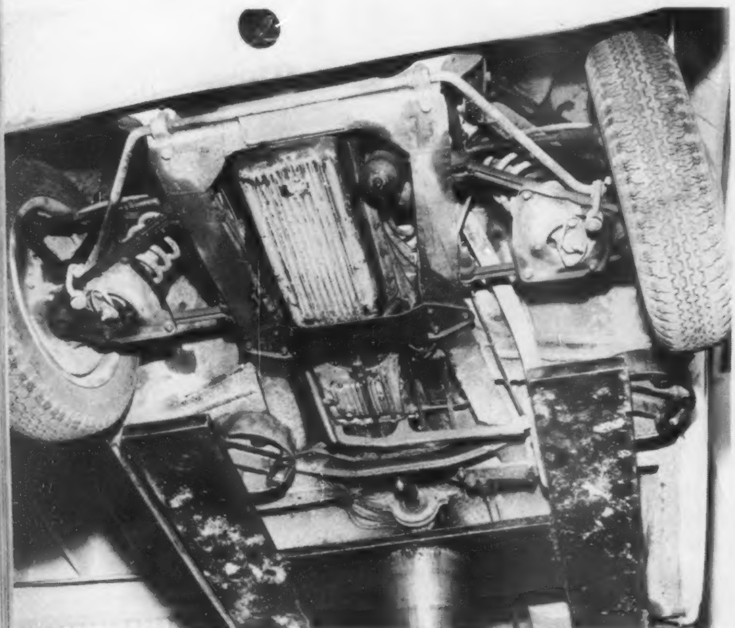
The heart of the Giuletta is a four-cylinder in-line power unit with chain driven overhead cams, nearly equal bore and stroke, and a displacement of 1.3 liters or 79 cubic inches. It cannot compete with its prewar forebears in terms of raising gooseflesh on lovers of straight-cut gears; the chain drive is quiet and so are the tappets. Nevertheless, the 1.3 does have the buzz-saw whine you would expect from an engine made to wind well beyond 6000 revs.

Alfa Romeo was one of the world's great pioneers in light alloy metallurgy. The 1.3 reflects this experience and only those parts that must be made of steel are. Block, head, sump, cam cover, intake manifold and fan are among the light alloy parts and the cylinder barrels are wet liners; steel sleeves in contact with the water jacketing. These are ideally cooled and so are the valves, spark plugs and combustion chambers.

The porting and manifolding of the 1.3 have the straight-through cross section that is one of the goals of the d.o. layout. The valves are operated by cup or piston-type cam followers which fit over double nested valve springs. There's a sign of economizing here. The classic Alfa tappet adjustment by means of serrated discs on the cups has been replaced by the now almost-universal but less convenient "button" adjustment. To change tappet clearances by this method it is necessary to remove the camshafts, remove the cups, and install a coin-shaped steel "button" of the desired thickness between the end of the valve stem and the cup.

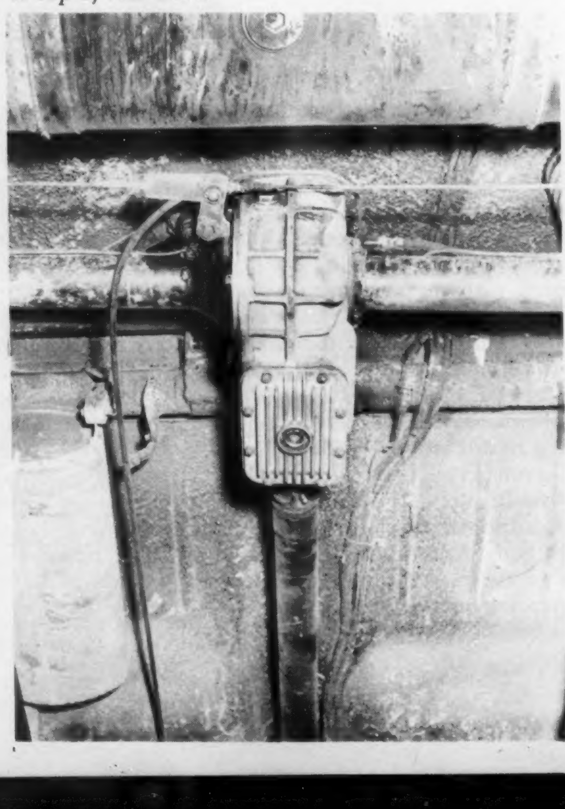
The 1.3 has five main bearings — the most you can put in a four cylinder engine — massively supported in an unusually deep and stiff crankcase. The bearings and bearing caps for crankshaft and camshafts are clearly numbered and there are many other signs of the designer's consideration for the mechanic, including excellent overall accessibility.

The only visible difference between the Berlina and Sprint engines is in their carburetors. In place of the standard model's single-throat carb the Sprint has a dual-throat Solex in which the throttle plate in the secondary throat begins to open after the primary throttle is about half open. Fuel economy and performance with this linkage both are amazingly good. But the car can be made drastically hotter by altering the linkage so that both throttles open simultaneously. I experimented briefly with the Spyder Sprint test car and obtained these results:



Underview of front end of car. Sump and transmission housing are ribbed aluminum. Frame and body are unit construction. Note steeply inclined springs around large shock absorbers.

Housing of final drive assembly is of light alloy — axle tubes are of steel. Exhaust system has two small, straight-through mufflers. Top of springs are anchored by tubular pillars extending through to top of rear deck.



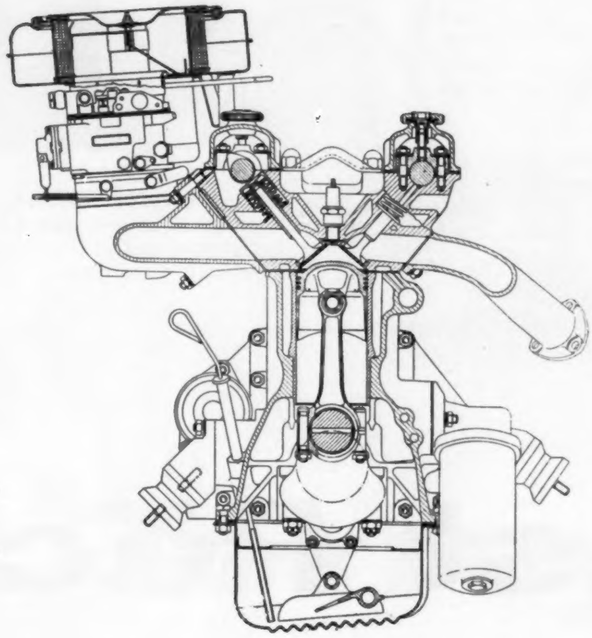


Diagram of engine cutaway shows typical Alfa dohc set-up. High torque characteristics allow engine to deliver 85% of its bhp to the rear wheels.

Measuring rim width. Outside width is 5.75 inches. Between each pair of holes, in wheel disc, is welded a small stud on which balance weights can be mounted.

Aceleration from	Stock Linkage	Modified Linkage
0 to 30 mph	3.7 secs.	3.7 secs.
0 to 40 mph	7.7 secs.	6.6 secs.
0 to 50 mph	9.2 secs.	8.2 secs.

As for internal differences between the 50 bhp standard engine and the 65 bhp Sprint, there is a large lack of this sort of information in the U. S., to which the Giulietta is brand new. But it's obvious that the Sprint engine has very different camshafts and its compression ratio may be higher than the nominal eight to one.

The performance of this tiny power unit is uncanny. When I first took the test car over and headed for open country I was astonished by its unexpected torque. The car would accelerate smoothly in top gear from about 17 mph and long grades had scarcely any slowing effect on the car's top-gear pulling power. Later I put the Giulietta on a chassis dynamoter and witnessed the road horsepower readings. Between no load and full load the muscular little engine dropped only 500 rpm. A popular 3½ liter d.o. engine, for example, can be counted on to drop about 1500 revs under the same conditions. And according to the dyno, 55 of the 1.3's 65 horses were reaching the rear wheels!

CLUTCH AND TRANSMISSION

The early Giuliettas had a pronounced fierceness of the clutch which vintage fanatics clucked over contentedly. But

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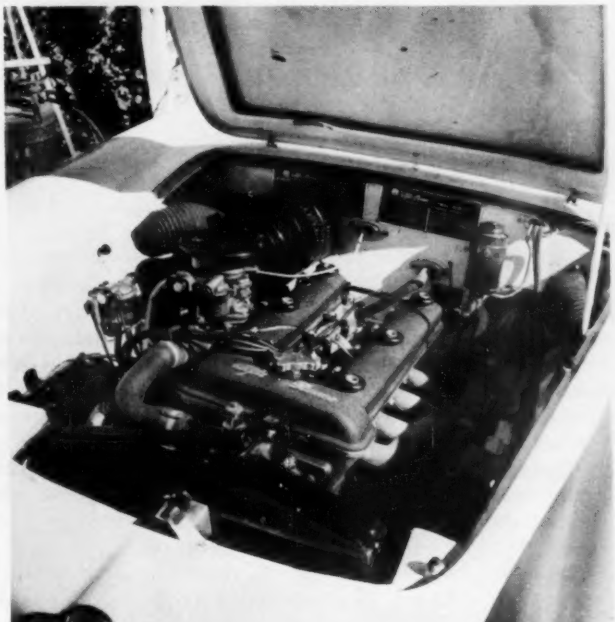
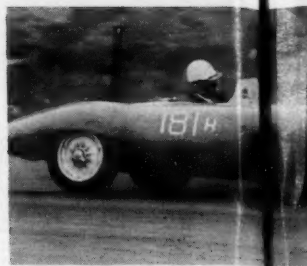


Attractively finished engine is exceptionally accessible in roomy compartment. Camshaft cover is done in black crackle-paint. Fuel line fittings are black enamel, and acorn nuts are chrome. Note air-ducts à la American machines.

Photos by Bob Rolofson

"Looks like I bent a wheel!" The Miles calm is unruffled after demolishing Porsche Spyder. Here he gives details to Sterling Moss, left.



The Last Race

Miles won under-1500 cc event on Sunday in new 550 brought from L.A. after earlier smashup.

By JIM MOURNING

WHEN the California Sports Car Club optimistically ignored San Diego's continually foggy weather to revive the reportedly defunct Torrey Pines circuit for one more race, fortune favored them beyond expectations. The two days of dicing not only attracted the most outstanding field of cars and drivers yet seen in the West, but drew record crowds both days, swelling the gross receipts to well over $50,000.

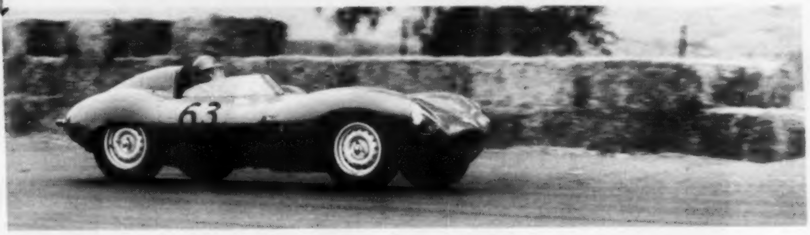
Despite the potential, however, the week-end supplied more than its share of disappointments to spectators who braved the threat of rain to see Saturday's six-hour grind and Sunday's schedule of shorter events.

With the brutal Palm Springs duel still fresh in their minds, many hoped that the endurance race would again see Ernie McAfee match his Ferrari against the Tony Parravano Maserati driven by Masten Gregory. But McAfee elected to shoot for the Index of Performance award in a Moretti and the Maserati never made it to the starting grid, arriving at the course after the gates were closed.

The failure to get the 3-litre Maserati to the track in time was just one highlight in what proved to be a ragged week-end for Scuderia Parravano. Skipping the regular technical inspection sessions and not bothering to make an appointment for scrutineering at the track, the crew showed up with the 1.5-litre Maserati minutes before the race on Saturday and had to have it checked out while sitting in position on the starting grid. When they showed up late again on Sunday and demanded inspection on the 3-litre machine, they did not endear themselves to the officials. Apparently, the officials weren't the only ones irritated by the way Scuderia Parravano was being handled. Shortly after the race, one of the mechanics told press representatives that he and eight others of the crew were quitting. As a topper, Pete Lovely, who drove the 1.5-litre on Saturday and was scheduled to repeat on Sunday, was so disturbed that he returned to Los Angeles and brought back

Francois Crouzet was awarded Index of Performance but only after much deliberation on part of the committee. Trouble was caused by argument over legality of black-flagging early in the race before the end of the 45-minute no-stop period.

One of several D-Jags was driven by Ignacio Lozano, former Kurtis handler. One D-type finished first making Jaguar top dog in West Coast distance races.



at Torrey Pines

his Porsche-powered Cooper for Sunday's fray.

With the Maserati out of the running, everything pointed to a battle between Ferrari and D-Jaguar, but this too failed to materialize. After the 4.4 Ferrari driven by Louis Brero, winner of the first six-hour tangle, was disqualified for using a push start, the only entries left to represent Ferrari were a pair of 2-litre machines driven by Phil Hill and Jack Brumby/Bob Sawyer.

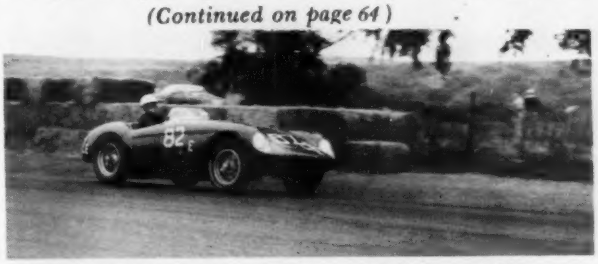
It soon became obvious that the small Ferraris were no match for the D-Jaguars, which immediately took command of the top three spots, led by Sherwood Johnston, who had been enlisted in the attempt to bolster Jaguar prestige following their dismal showing at Palm Springs. During the early going, the only car able to crack the combination was a Jaguar Special driven by Fred Woodward and Harold Erb, who held third spot for several laps before slashing into the dirt and splitting the oil sump.

At the 40 minute mark, with a relatively secure 40 second lead, Johnston tried stretching it and ran into trouble. Wheeling hard through a corner, he slammed into the hay and was forced into the pits for repairs before the 45-minute minimum time limit. When official word of his disqualification came, Johnston moved over to co-drive with Jerry Austin, whose D-Jaguar was running in second spot.

With Johnston's car out, Pearce Woods, winner of the previous six-hour race, took over, followed by Austin and Hill, who was some thirty seconds behind the leader. Then Hill began to open up. At the end of the second hour it

(Continued on page 64)

Shrrwood Johnston gives winning D-Jag a load of fuel during the 6-hour event and gets a load of advice from team-mate in return.



Venerable Mondial, third-hand machine owned by Manning Post, was driven hard by Phil Hill but couldn't stand the hot pace handed out. BELOW, Masten Gregory copped Sunday main in Maserati.

Top Secret

Photo Story By BOB ROLOFSON

Rear view of Porsche jeep, better known as "The Hunter," features same engine as famous Porsche.

Skilled German mechanic assembles drive unit of Porsche before installation. Tolerances within housing must be critical for maximum performance. Note ratios.

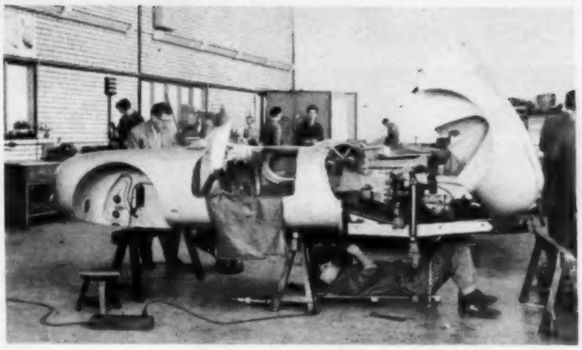
THE Porsche racing section is not unlike any of the other large, well lighted, very clean sections of this modern factory. Three quarters of the working space is given up to racing and experimental work, while the other third is devoted to prototype work on the long awaited Porsche jeep, called "The Hunter."

Actually, the racing section of the Porsche plant is a hot rod shop, where extra push is injected by experimenting with engine components, lightening frames and streamlining bodies. The instruments are simplified for quick readings at high speed, and seating and driving equipment are carefully "fitted" to the individual team drivers.

Beyond these well-known methods of making a series production car go faster is the point where the automotive engineers take over. Pet suspension theories come to life and are built, tested, adjusted, retested and then either incorporated into a chassis for further competition testing, or discarded for one reason or another. Frame modifications, readjustments of weight distribution and steering are tested along with anything which will speed up the car safely.

The result of this attention to detail is that the Porsche factory teams have been virtually unbeatable in class since 1952 in every race of any importance anywhere in the world. The list of events entered and events won would fill a good sized and very boring book. Porsche teams enter upwards of 400 events a year and have taken home enough hardware to load a box car in the process.

These victories are not mere show, either. Porsche's sales curve has risen rapidly the world over, a point which is due in large part to the company's racing activities. It is for this reason that European racing shops are guarded as jealously as Detroit styling sections. Although the pictures here show much of the activity, sharp-eyed readers will notice that not one really new engine is on view. They were there all right but it would have been worth my neck had I made a move



A Porsche Spyder in the process of being assembled. Here, mechanic tends to detail-work prior to engine instatlation.

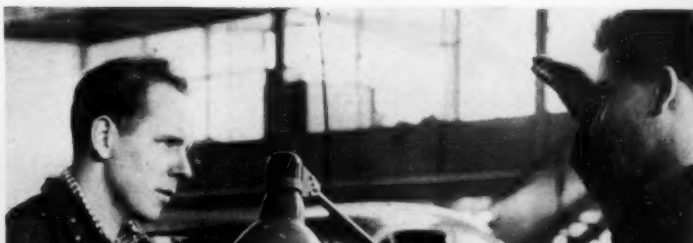
t Stable

Porsche's racing section is out of bounds and with good reason. Winning races means winning sales in a world market.

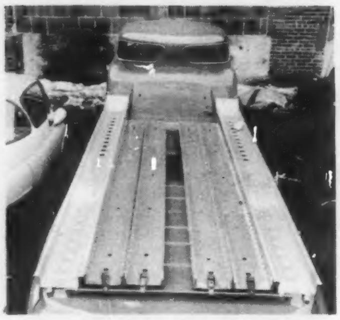
Front view of the Porsche Spyder. Battery and spare are carried here. Bulge on left fender is rear-view mirror.

toward the camera. In one stall was an engine purring away smoothly on a test bed and one of the engineers remarked that it was being developed for an independent Detroit manufacturer—"but no pictures; so sorry." No details either. That was the way it went throughout the experimental section; I felt like a kid in a candy store—look but don't touch. "And don't ask so many questions."

It's obvious that these people mean business and they mean it for the '56 season. Throughout the entire racing section there is the feeling that no one—but nobody—is going to cut short that list of racing and sales wins. Maybe Maserati or EMW could do it but it won't be easy; the Porsche Volk are experts at winning. #



Assembling famed air-cooled Porsche engine, mechanics discuss details of work. Plant also handles production models scheduled for competition.



To cut down weight, channels are of light alloy material, and drilled. Tubular support carries weight of race car when loading for transport.

Germany's answer to the California Pickup

Torrid Transport

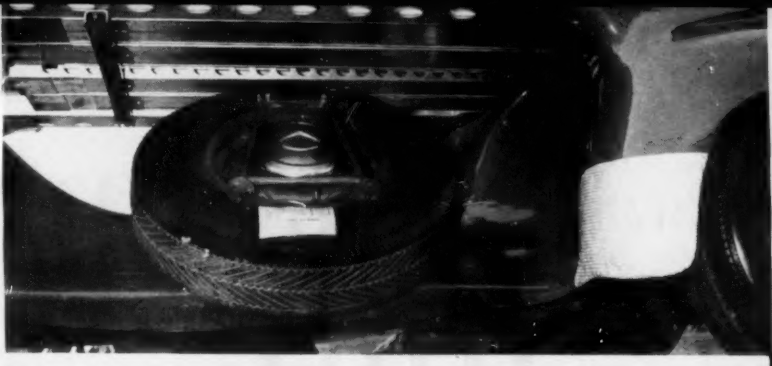
Profile of Mercedes-Benz transporter displays unique almost aerodynamic design. Used to carry famous 300 SLR, transporter can cruise at 100 mph with ease. It employs same engine used in Mercedes 300 SL. Top speed—105 mph.

DURING the Thirties when Germany's Mercedes and Auto Union racing teams dominated the competition scene the saying was that "even their trucks were unbeatable." Mercedes in particular ran a fleet of supercharged transporters that lugged both race cars and shop equipment over Europe's roads at speeds up to 100 miles an hour, allowing race car preparation at the factory practically up to race time.

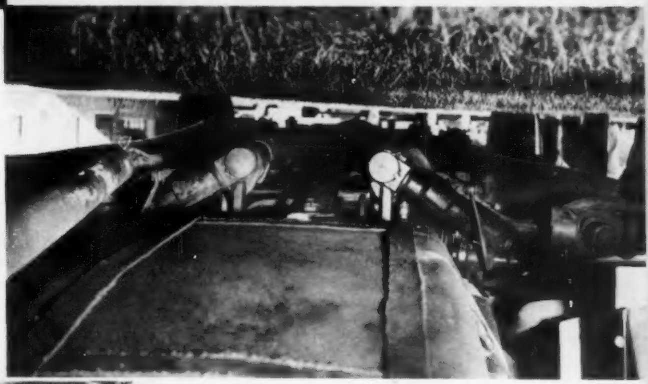
In 1955, when Mercedes repeated their prewar performances by taking the Grand Prix, Sports Car and Production Sports categories, making a clean sweep of the world competition scene, track-wise onlookers were amazed at the speed with which Daimler-Benz could yank a car out of pre-race practice, get it to the factory and return it to the track, all before race time. The answer was, of course, that Mercedes had come up with another hot rod truck — something that should have been expected in view of past performance.

Although not as elaborate in concept as the old Diesel screamers, the new one is just about what could be expected from the engineers who build such machinery as the 300 SL — very desirable property indeed. From front to back the kinship with the gull-wing coupe is apparent even unto the fuel-injected 300 SL engine that can move the transporter along at 105 miles an hour, loaded with crew and race car. Suspension is by torsion bar and fully independent both front and rear. The rear end uses the low pivot point swing axle pioneered on the 190 SL and the 300 SLR. Brakes, always a high point with Mercedes, are the same huge 257 square-inch binders found on the 300 SL and are augmented by a new Daimler-Benz gadget known as an "exhaust brake."

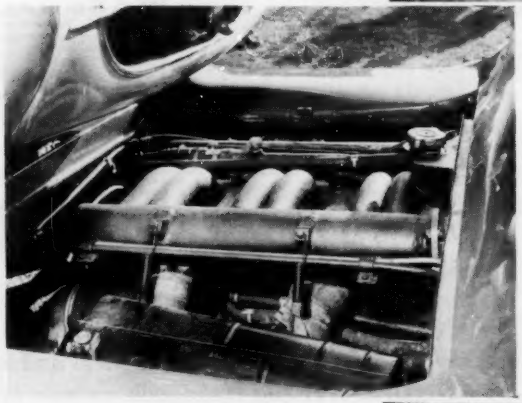
This last piece of equipment is worthy of comment. A pull at a lever inside the cockpit next to the racing-type stub shift lever shuts off fuel at the injector and at the same time partially closes off the exhaust system. The result is that the engine is abruptly turned into an air compressor pumping against the increased back pressure in the exhaust system. Since the force needed to operate this engine-turned-compressor must perforce come from the drive wheels the braking effect of the system can readily be seen. Any tendency to skid can easily be overcome in a



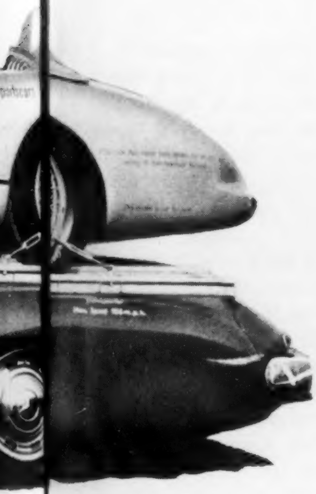
Spare wheel mounted conveniently on body sits between front and rear wheels. Loading channel support lies compactly on spare. All available space is utilized.



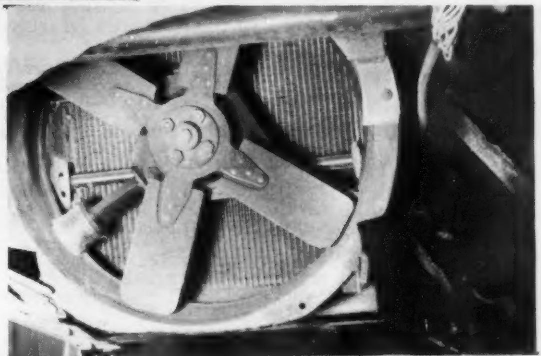
Looking toward front, view shows differential carrier, and extra low pivot points of swinging rear axle.



Photos by Dan Rubin



Engine is placed behind driver's compartment. Oddly enough, water cap is not on radiator.

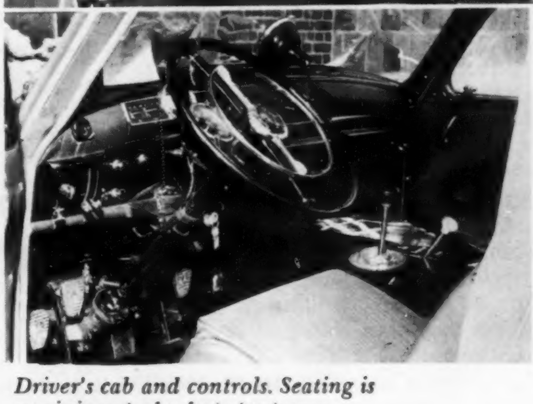


Radiator and fan assembly located at rear. Fan is driven off driveshaft through set of bevel gears.

similar manner to that used on a dirt track race car with its rear-wheels-only braking system. Even the comfortable cab is reminiscent of the 300 SL with its two bucket seats, high center tunnel, race car steering wheel and stub lever.

The truck, ostensibly brought to the United States only as a show platform for the Championship 300 SLR during its Detroit showing, stole the scene completely from its glamorous burden. Queries on the order of "Where can I buy one?" and "When will it be available?" dropped from all sides on Mercedes' New York headquarters. Unfortunately the only answer was an expressive and non-Germanic shoulder shrug; the truck at present is in a category with Uhlenhaut's personal coupe — strictly engineering division property. From the interest evidenced, however, it is certain that word of the clamor will reach Germany ahead of the returning truck and the men of Stuttgart have never been averse to making a buck when possible — in fact it's part of their success formula.

As one Mercedes man put it: "Who knows? Maybe in a year or two . . ." The 300 SL was only a Uhlenhaut play thing a couple of years ago too. #



Driver's cab and controls. Seating is reminiscent of a fast sports car. All controls are at finger touch, and utilitarian in design.

SCI Road Test: Corvette

(Continued from page 27)

Precision balancing after assembly may have accounted for the clean, smooth running of the engine, and its ability to rev freely to around 5500. For about the first half inch of throttle travel only the rear one of the two four-barrel carburetors is working to prevent overcarburetion at low speeds. When the front quad cuts in the previously unobtrusive exhaust note sharpens and the car starts to move. When backing off at higher speeds there is a not unappealing rap from the duals. Idling is at 1000 rpm when the automatic choke is working and 600 rpm when warm, and the powerplant is tractable enough to lug down to a 12 mph in high.

Featuring special cooling and nine coils instead of the old diaphragm spring, the clutch took a lot of punishment without complaint. It is not easy to get a potent car off the mark with such very high gearing, and this component took the brunt of the effort without signs of heating or slippage. The gearbox wins similar praise for its well-chosen ratios and effective synchromesh. Shifting linkage is smooth and direct, the heavy-knobbed lever being spring-loaded to the right-hand side of the conventional "H" pattern. The synchro can be beaten by a very quick move from first to second, but the movement between the two top gears is impeccable. Synchromesh on low would be a useful boon, but a noiseless downshift can be made by double-clutching.

Due to the high ratios, the standard-shift Corvette is not really at home in town, and Powerglide might be better for urban use. Out on the road, though, as second gear takes over from first at around sixty and keeps the seat in your back 'til over a hundred, you learn what this car was made for. Cruising is effortless at 85 or 90, though with enough wind noise over the soft top to render the radio unintelligible.

It is in the handling department in particular that the Corvette proves itself the only true American production sports car. The steering is far from perfect but it is fast enough to allow right angles to be taken without removing the hands from the wheel, and this virtue will make up for many vices. The latter include an inch and a half of play, beyond which a strong caster action gives the wheel a springy feel. This little "no-man's-land" in the middle causes some trepidation in tight spots. Once the wheel has been set for a bend, and the car has assumed an initial roll angle, the steering and throttle response are fast and consistent enough to allow very precise control.

Like most American cars this Chevrolet is a very strong understeerer, and requires a lot of helm to keep it on line in a bend. The stock rear end damping is a little weak; too much so to make a full-blooded drift a stable proposition. Cornering speeds and behavior were markedly improved by tire pressure five psi higher than the standard of 25 psi front and 27 psi rear. Raised pressures plus stiffer rear shocks could combine with an already broad track, good weight distribution, and low center of gravity to make the Corvette a real fiend on corners. These criticisms, it will be noted, are minor, and apply equally to many imported machines.

Of course, tire squeal is not entirely absent during these high-speed direction changes, but the car stays in the corner so there can be no real complaints. The Corvette is at its best on a winding open road, and, like the Jaguar, is dramatic but uncomfortable on a twisty back lane. The test car would have been much handier there if the driver had had more arm room and the optional seat belts. He tends to be thrown around more than necessary, but is not as conscious of the car's roll angle as is the passenger.

Brakes are still by far the weakest link, and it must be admitted that they faded almost into oblivion during the performance tests. They recovered very quickly, though, and pulled the heavy car up with a minimum of slewing even when very hot. I sincerely feel that the substitution of harder Moraine linings or some of the foreign competition brands will improve high-temperature durability and perhaps modify the present spongy feel of the pedal. No power booster was fitted, and required pedal pressure was on the high side.

Very sensibly for a high speed car, the hood is hinged from the front, and opens well out of the way. The battery and brake master cylinder are easy to reach, and the small air cleaners ease access to the engine as a whole. Most awkward feature is the shielding for the ignition wiring, necessary to eliminate radio interference in a Fiber-glas body. Wingnuts quickly free these shields and bare the double-breaker distributor and all but the two left front spark plugs, which are tucked in behind the steering box.

The hydraulic system for the top mechanism is powered by a separate electric motor, which allows operation with the engine off and avoids direct absorption of any engine power. Individual motors operate the door windows.

Well finished and fitted, the trunk is usefully large for a sports car. All luggage must be removed to extricate the spare from its wooden-lidded compartment, which also houses the jack. One carrying feature of many imports that is missed in the Corvette is that handy space right behind the seats for coats, hats, lunches and other items that you don't want to store in the trunk. In the Corvette you either live with them or lock them away.

In almost every respect, the 1956 Corvette is a very satisfying car on the highway, and supplements astonishing performance with a high level of road-holding. Even as it stands, power equipment and all, it has become a serious competitor for Jaguar in Production Class C, and this is by no means General Motors' highest goal. In international events this year the car will be equipped with an optional cam providing 250 bhp at the sacrifice of present low-end smoothness. Also on the fire for either this or next year are engine boosts to 275 bhp, extensive use of light alloy in both body and chassis, and the development of suitable disc brakes by GM's Moraine Division.

It seems likely that the standard Corvettes will remain much as they are, with work on the competition versions proceeding simultaneously as has been the case with Jaguar and their C and D models. Another two or three years could probably see a racing Corvette with as many standard parts as the D retains from the Jaguar line, shrouded in advanced coupe bodywork. GM will learn an incalculable amount from these cars, much of which will be passed on to the standard Corvette and to the passenger car. They've already learned quite a lot, as a matter of fact, most of which shows up in the all-around excellence of the 1956 Corvette. #

The hottest Jaguar

(Continued from page 37)

wheel, fuel and tank, and this it does by stressed internal diaphragms instead of a framework as on the prototype. Two horizontal struts below the axle add support in compression. The fuel tank itself is flexible, of "rubberized" fabric, and is housed in an alloy box in the tail.

With the tail removed the D-Type looks odd indeed, since the live axle is suspended directly from the rear bulkhead. Two flat steel trailing arms 16 inches long form a parallelogram on each side, absorbing braking and accelerating torque reactions as well as providing fore-and-aft axle location. The upper arms are simply rubber bushed, while the forward pivots of the bottom arms engage the extremities of a transverse torsion bar through internally-and-externally splined vernier couplings. An enlarged center section of the bar is splined to its surrounding tube, giving, in effect, a separate torsion bar for each wheel. Lateral axle location is looked after by a large A member, with its spex fixing the rear roll center at the differential casing.

The forward ends of the four trailing arms and the pivots of the A member are located on two vertical fabricated posts which are connected at the bottom by the torsion bar housing and the top by a smaller tube. Cirling shocks with built-in bump stops also act from these posts, which in turn are bolted to boxed stiffeners in the rear bulkhead. In action, geometry requires the trailing arms to twist slightly, and their flat section allows this and provides additional roll stiffness.

Praise is due the very neat front suspension, which is one of the cleanest parts of the D Jaguar. Of the well-known parallel wishbone type, it also uses the ball joints that are now common on both sides of the Atlantic. The wishbones themselves are beautifully forged, and the slightly shorter top arm has eccentric and threaded pivots at the frame to allow adjustment of caster and camber. Simple pivots are used for the lower arm, and from them the forward leg of the wishbone extends inward far enough to provide a splined mounting for the forward end of the longitudinal torsion bar, which is not, then, concentric with the bottom arm pivots, and is thus subject to very slight bending. Twenty-four splines at the forward end and 25 at the frame connection allow a vernier adjustment of height.

An anti-roll bar is now fitted at the front, and Girling shock absorbers again do the job, acting on the lower wishbones. Steering is by rack and pinion, the box sitting high and controlling the wheels by links and arms forward of the wheel center. The steering column is in two sections, with two universal joints in the control shaft.

Also in the chassis department and also unusual are the Dunlop wheels and brakes. That "Indianapolis" look is caused by the pierced aluminum-alloy wheels, which carry a steel center section and five bolts, the domed heads of which engage with holes in a hub

plate and thus transmit braking and drive torque. These increasingly-popular discs are lighter than the equivalent wire type, and are retained by three-lobe locking nuts.

Design of Dunlop disc brakes for competition has reached an initial stage of stability, but many aspects of service are still left to the discretion of the owner. The basic layout first distributes braking effort by providing three pairs of pads for each front disc, and two pairs per wheel at the rear. In the Dunlop system, each pad has its own small hydraulic cylinder, and these are bored in appropriate groups in light alloy blocks, which are separated from the pad-bearing calipers by pylons. Air can thus pass between the pad and the piston, and can keep the hydraulic fluid at a reasonable temperature. Clearance is automatically held around 0.010 of an inch, and 13/16 of an inch of wear are allowed before new pads must be cemented to their carriers. When they have "dished" much more than 0.020, the discs themselves should be replaced.

Additional proportioning of braking force is effected by the clever and simple servo system. The front section of the servo cylinder is basically an ordinary master cylinder, applying the front brakes only. Behind the piston of this cylinder, fluid is kept continually circulating by a Plessey pump driven from the rear of the gearbox. A take-off from the inlet of this circulating system leads directly to the rear brakes. When the pedal is pressed, the forward piston immediately actuates the front brakes manually, and a rear piston begins to restrict the outlet of the circulating fluid. Pressure is thus built up, which supplements the effort on the front piston and applies the back brakes directly. The degree of restriction can be varied to modify the servo effect.

Front and rear systems are thus hydraulically separate, and the front pads will always be applied if the pressure pump is inoperative. A by-pass valve prevents air from being drawn into the system when the car is backing up, and additional mechanical calipers at the rear provide hand braking. The whole servo system is, of course, necessary to avoid excessive pedal travel as a result of feeding twenty wheel cylinders, as well as to make up for the lack of servo in a disc system.

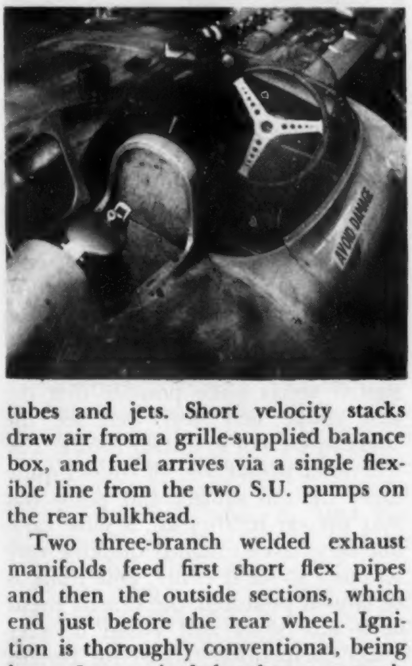
"XK" has been the password at Coventry for seven years, and it still applies to the production D-type engine. The cast iron block, the forged steel connecting rods, and the forged EN-16 steel crankshaft differ only in minor machining from Mark VII parts, while the head is a modified aluminum alloy C-type casting. Vandervell indium-lead-bronze bearings carry the seven main and six rod journals, which are 2.750 and 2.086 of an inch in diameter respectively. The crank is not fully counterweighted, the feeling being that torsional vibration would be more of a problem than bearing loads, and to the same end a large steel vibration damper is fitted at the front. This plus the mass of the special clutch eliminates the need for a separate flywheel.

The two-bolt H-section connecting rod is drilled to lubricate the fully-floating wrist pin, which is held in the full-skirted Aerolite piston by circlips.

A special Dykes design for the centrifugally-cast top rings greatly reduces blow-by at high piston speeds, and a single Maxilite oil control ring is used. Recommended skirt clearance is .006 of an inch, which could probably be almost doubled for shorter races, or for use with hot fuel.

A two-stage Renold duplex roller chain, controlled by a Weller spring tensioner, drives the twin overhead camshafts, which in turn operate the valves through cups sliding in inserted cast iron guides. The cam contours retain the $\frac{3}{8}$ lift of the M and C cams, but increase intake duration by 30°, to a total of 270°. Still larger than in older versions, the valves are symmetrically placed with an included angle of 70°, and returned to their seats by double springs. These changes, aided by a $\frac{1}{2}$-point compression ratio increase to 9 to 1, have brought the power up 30 bhp from the 220 bhp C-Type.

Basic porting has not changed from the original Weslake layout, the intake passage being slightly curved to provide turbulence. The spark plug is at one side of the hemispherical chamber, in such a position as to produce a flame front moving away from the intake valve. So much room is taken up by the three twin-choke Weber carburetors and their associated plumbing that the engine is canted $8\frac{1}{2}$ degrees to the left on its three-point mounting to allow space at the top. Giving a 45 mm bore and 38 mm choke for each cylinder, the type 45 DC03 Webers supply very accurate mixtures at high lateral G's, thanks to the centrally-disposed emulsion



tubes and jets. Short velocity stacks draw air from a grille-supplied balance box, and fuel arrives via a single flexible line from the two S.U. pumps on the rear bulkhead.

Two three-branch welded exhaust manifolds feed first short flex pipes and then the outside sections, which end just before the rear wheel. Ignition is thoroughly conventional, being by a Lucas single-breaker automatic advance distributor, with a chassis-mounted Lucas HV12 coil.

Partly to facilitate oil cooling, but mainly to reduce engine height by $2\frac{3}{4}$", a dry-sump oil system is used. A transverse shaft at the front of the engine is gear-driven from the crankshaft, and powers the scavenge pump on the left and the pressure pump on the right. The steel drive gear of the scavenge pump engages with two cast iron idlers, to facilitate the use of two separate oil pickups at front and rear of the shallow sump. This pump attempts to fill the three gallon oil tank, which rests on the left and is vented to the crankcase. The single-idler pressure pump, however, draws from the tank and sends SAE 30 oil at 45/50 psi through the oil cooler and back to a transfer block which then supplies the main gallery. Owners are cautioned to change oil before every race!

Front-end space is shared by the vertical oil radiator and the Marston light-alloy water matrix, which is connected to the separate header tank by two hoses. The tank in turn gets hot water from a gallery cast into the intake "manifold." A pressure valve on the header tank keeps the system under a pressure of around 4 psi, and the operating temperature should be about 70°C.

As mentioned before the D Jag has no flywheel as such, and the pinion of the gearbox-mounted starter engages a ring gear on the clutch body itself. The two metallic driving discs are splined to the outside body, and of the three friction-faced driven discs, two are internally splined to the hub of the third disc, which is splined to the gearbox clutch shaft. A Girling hydraulic unit overcomes the force of six springs and small centrifugal weights to disengage the discs. This type of clutch, while tending to be rough, has favorably small unit and centrifugal loadings.

A wholly new transmission has synchromesh on all four of the helical, constant-mesh gears, and the lowly spur gear survives only in reverse. SAE 30 also is used here, and is a mainshaft eccentric. The short Hardy Spicer drive shaft has a sliding spline and two Hooke-type universal joints.

Another "like-standard" part is the Salisbury differential housing, which carries the hypoid final drive gears. Jaguar recommends that a separate housing be used for each ratio contemplated for competition, to save wear on the tapped holes, and also point out that dimensionally different housings are necessary for ratios above 3.54 and below 3.92. SAE 90 hypoid oil keeps things turning smoothly.

The D-type driver is faced by a 180 mph speedometer and a tach red-lined at 5800 and driven from the left-hand camshaft. He also knows oil pressure and water temperature but not oil temperature. The interior on the whole is very well finished, and all fuses and junction boxes are readily reached on the passenger's side. No full belly pan is fitted, the engine and drive line being exposed underneath for accessibility and cooling. Oddly enough, the engine must be lowered out of the chassis, and does not just lift out the top.

The production D-Type as outlined above is right on a par with the 1954 prototypes and is thus a hot machine in its own right, but Bill Haynes at Jaguar realized that something hotter under the hood would be needed to deal with the SLR Mercedes, so some significant modifications were fitted to the factory cars only in 1955.

Most important was an entirely new head casting, which breathed so well that more power was realized at lower revs, and the peak torque speed raised by 1000 rpm. In the new head, also developed by Harry Weslake, the inlet valve remains inclined at 35° to the vertical, but the exhaust stem now leans out at 40°. Identifiable by a square instead of a circular front inspection plate, the new design did not give complete satisfaction at Le Mans, so the factory decided not to release it quite yet. As a result, little is known about it, but it obviously has longer velocity stacks and almost certainly has much wilder cams and larger, straighter ports. A further refinement is the use of long double exhaust pipes intended to derive an extractor effect from a low pressure area at the rear.

Body changes were also in order, to improve already fine streamlining and give better driver protection. To these ends the nose was lengthened $7\frac{1}{2}$ inches and fitted with brake cooling ducts, while the windshield was raised and faired back into a higher and cleaner fin. After some prolonged pit stops in 1954, an exceptionally large fuel filter was fitted in the cockpits of the 1955 team cars.

Briggs Cunningham's Le Mans Jaguar was privately owned, and as such could not use the prototype head that was allowed the factory machines. His car therefore was a production car in all respects save the nose and tail, which gave it the "team car" look. Once in this country, the D proved very difficult to handle on characteristically tight American courses. Excessive understeer (for Le Mans stability) made it tough to haul around corners, so the Cunningham team went to work.

They fitted soft, sticky Pirelli tires in the front, and harder Firestones in the rear, also cutting the front tire section to 5.50. More interesting, they con-

(Continued on page 58)

Jaguar

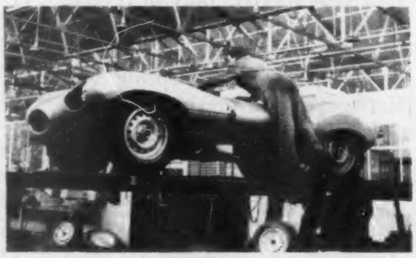
(Continued from page 57)

nected the two bottom rear trailing arms with a torsion anti-rolling bar, sensibly decreasing the rear cornering power. Both at Nassau and Palm Springs D-Types have suffered from lateral stabilizer failure, a weak point shown up by much more strenuous U. S. cornering conditions.

Short courses are also hard on brakes, and a disc can't dissipate heat without an air supply, so the front ducts are supplemented by 1954-type scoops. New ducting clamped to the axle tubes also picks up air from beneath the car and directs it on the leading edge of the rear discs. Just in case, a radiator blind is fitted that pulls down from the top window-shade-fashion and can be controlled from the cockpit.

Johnston didn't go over 6300 rmp at Nassau, and yet managed to break up the front connecting rod. On the other hand, Moss ran his engine up to 7200 in the '54 Le Mans, probably on the overrun when suffering from bad brakes, and didn't bust anything. The factory recommends that speeds above 5750 rpm be held for short periods only, and that upshifts be made at 5500. Gearing should allow the D to reach but not exceed 5800 on the straights. 5750 rpm move the pistons at 4000 feet per minute, which is a reasonable limit for the present-day engine, and exceptional for a ten-year old concept.

Attempts at prediction are always risky, but if Jaguar enters the 1956 Le Mans under the announced prototype rules, they might do well by adding long-awaited fuel injection to the 2.5 litre block that was tried in the 1954 Tourist Trophy and later ap-

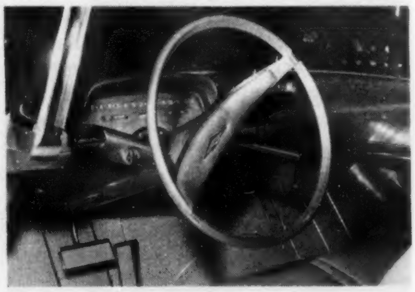


peared in the "2.4" sedan. Such a combo would be good for 100 bhp per litre anyway, and should wind up like a buzz saw. The great value of the Jaguar standard line is in no small way related to the lessons learned from such fabulously fast road machines as the hottest Jag: the D-Type. #

Chevies

(Continued from page 17)

already in volume production and not for the Corvette alone. This is a very hefty plant with a claimed 225 horsepower, peaking out at 5200 rpm which is probably the highest peak speed in the industry with only one exception. Torque also comes in at a fairly high 3600 rpm with a rating of 270 lbs/ft. These high rpm figures account in part for the seeming fact that Chevrolet's horses appear more powerful than those developed by other engines. Carburetion is provided by two four-throat units, one of which opens ahead of the other to prevent over-carburetion. Compression ratio is 9.25 to 1, a squeeze which points definitely to the use of premium fuel as S.O.P. One of the biggest extra-power items in the engine, however, is a camshaft that literally screams "full race" when the characteristics become known. Lift is .404 of an inch at the intake valve and .413 of an inch at the exhaust valve. Duration for the intake is 264



degrees and for the exhaust 266 degrees. Valve acceleration or rate of lift is also quite high for a Detroit product. Despite these characteristics idle speed is reasonably low and there is very little lope even at engine speeds as low as 600 rpm.

In view of Chevrolet's past performance in producing some version of each dream car (with the exception of the Biscayne and Corvair) coupled with the practicality of the Impala design it seems quite possible that the new coupe may very well see the street in the not so distant future. The Chevrolet people are, of course, quite cagey on the subject and point out that the car is, after all, a show car—but they haven't denied thinking very seriously about it either. One thing is certain—if produced, the Impala could be a sure seller and would be very rough competition indeed for certain of the more glamorous products of rival manufacturers. #

Gregoire

(Continued from page 41)

may be cheaper than a steel pressing, requiring less tooling. It is also claimed to be particularly suitable for the installation of a plastic body, thanks to the greater rigidity of the frame, avoiding distortion and resulting cracks in the plastic. In a sports car, of course, frame rigidity is absolutely essential and that is why the Gregoire Sport uses that type of construction.

The Gregoire ultra-light car of the early forties later became the Dyna Panhard. Slightly modified by Deutsch-Bonnet (the D. B. Panhard), it has performed extremely well at Le Mans in recent years. In the index of performance rating, allowing for the differences of power between different cars, the D. P. Panhards have been consistent winners. They have (naturally) front wheel drive with Tracta joints, a flat-twin air-cooled engine and a light metal frame. Considering that the engine has a displacement of only 750 cc's, the car's performance is remarkable.

In 1947 Gregoire presented a new car at the Paris Motor Show, this time a full size model, following his by then traditional pattern of design: front wheel drive, variable suspension, light metal frame. It was notable for its extremely low gasoline consumption – only 32 miles per gallon for a generously sized five seater sedan with a top speed of 90 miles per hour. Economy was not the designer's primary objective in this case, but it was rather the by-product of very light weight in relation to size and good streamlining. This design was later adopted by the French Hotchkiss Company and is still made under the name of Hotchkiss-Gregoire.

It is interesting to note that although the 1956 Gregoire Sport appears quite revolutionary to the average American motorist, all the unusual components of the car have been tested over a period of many years. This shows how far ahead of his time Gregoire was in 1926 for the front wheel drive, in 1953 for the aluminum frame and in 1941 for the variable suspension.

In 1949 he was awarded the annual Gold Medal of the French Society for the Promotion of Industry, founded by Napoleon in 1801. Only two other men connected with automobile design ever received that distinction: in 1862 de Rochas, inventor of the four stroke engine; and in 1921 the marquis De Dion, the great motoring pioneer.

Gregoire is today a man in an enviable position, one that many of us might dream about. He is a free-lance designer with his own factory in which to manufacture prototypes. He has no sales manager, no vice-president in charge of production, no board of directors wield their whips over his back. He simply designs his cars as he thinks fit and then offers the completed model to the highest bidder among large scale manufacturers. They can take it or leave it. The income from his numerous patents makes Gregoire independent of his customers. Besides, he is not interested in growing into a French Ford or Enzo Ferrari, with the difference that he no longer goes into racing competition.

Gregoire is primarily an artist. He has written several books on motoring subjects and branched out recently into fiction. His first novel "The 24 Hours at Le Mans" uses a background with which Gregoire is thoroughly familiar.

In 1927 he drove practically the entire 24 hours single-handed when his co-driver was injured on the eve of the race. The subject of the novel – aside from the romantic interest – is a fictional attempt by a new turbine car to beat the Jaguars and Ferraris.

Turbine cars are not entirely unknown to novelist Gregoire. In 1952 he designed a turbine automobile for the French Socema Company. It was never manufactured owing to economic reasons, but it performed very well indeed in tests.

Gregoire has also designed electric cars – this during the wartime gasoline shortage.

His publications include a treatise on California wines – an item not recommended for reading by West Coast patriots. Gregoire is a profound student of wines, keeping a small cellar under his factory at Asnieres near Paris. "It keeps better there than in the city. No vibration from subways nearby," he says.

Gregoire's latest effort is not primarily intended as a competition car, although it perhaps could become one with some modifications. It made its Stateside debut at the Ford Museum in Detroit as one of a series of "personal cars."

Seating three abreast, the car is far roomier than most sports models. The location of the engine with the entire transmission in front leaves a completely flat floor and plenty of room for luggage in the back.

The engine is a flat-four, water-cooled. In accordance with current practice it is oversquare with a 3.54 inch bore and 3.38 inch stroke and a volume of 133.51 cubic inches. The Constantin supercharger delivers 4½ psi boost at 4000 rpm. Power at 4,500 rpm is a claimed 130 bhp. The use of a supercharger gives good torque at low speeds and a favorable power-to-displacement ratio without excessively high engine speeds.

Fuel consumption for an average speed of 65 mph is only 17 miles per U. S. gallon, despite the use of a supercharger. This is probably due to the low weight (2200 lbs.) and small frontal area. These factors are probably also responsible for the top speed of 118 mph. Accurate acceleration data is not yet available.

The four speed gearbox gives the following speeds per 1000 revs:

First	7 mph
Second	15 mph
Third	19.4 mph
Fourth	25.6 mph

It will be seen that the advertised top speed of 118 mph is obtained at less than 5000 revs. – which clearly leaves plenty of room for improvement. The standard compression ratio is only 6.9 to 1 – which again shows that far from being overstressed the car has plenty of stretch left for future modification – if one is brave enough to try it in the presence of the blower.

The steering is, of course, rack and pinion – usual with front wheel drive layouts.

Where the Gregoire Sport scores is in the roadholding department rather than in straight performance, although it should be quite creditable if we go by power to weight ratio. Front wheel drive often confers on any car quite exceptional cornering ability – a Citroen is well known to be able to take a hardcorner considerably faster than a corresponding rear drive model. Coupled with this is the weight distribution with two thirds of the weight on the front driving wheels. Good wheel adhesion is quite a point if the horses are to pull the car instead of burning

rubber. The variable suspension, together with two anti-roll bars in front and back, gives the Gregoire Sport excellent lateral stability without sacrifice of comfort.

It would certainly be interesting to match a Gregoire Sport against a Thunderbird or a Corvette on a winding mountain road. The chances are that its superior cornering would more than offset the disadvantage in acceleration, if there was any. For a match against semi-competition models some modifications to the Gregoire power plant would be necessary before a fair comparison could be made.

If the Gregoire Sport was described as a French answer to the Porsche, the Dyna Panhard – also a Gregoire design – is clearly the opposite number of the Volkswagen. Manufactured in smaller quantities, it is more costly, but designwise it is strictly the equivalent of the other creation of Dr. Ferdinand Porsche. The Dyna Panhard is a direct descendant of the Gregoire light car design of 1946 – the car that was flown to Oakland, California, at the request of Henry J. Kaiser.

It is a full five seater sedan, yet it weighs only 1562 lbs. Low weight is the key to the remarkable efficiency of the Dyna, which attains a top speed of nearly 80 mph with an engine of only 850 cubic centimeters (51.8 cubic inches!) displacement.

The miniature Dyna engine delivers a respectable 42 bhp at 5000 rpm. This is somewhat more than the Volkswagen engine which has a larger displacement. In fact the power per cubic inch ratio of the little two cylinder air-cooled Dyna is about the same as that of the 1956 Cadillac, despite a moderate 7.25 compression ratio.

To the French, Dyna's principal attraction is the extraordinary thriftiness of that five-seater, roomy by European standards. The Dyna has been officially tested at Monthlery with the following results: fuel consumption at 50 mph – 39 mpg. The same car, with the same carburetor setting, clocked 80 mph.

Some argue that the Dyna is superior to the Volkswagen in efficiency and performance. Unfortunately the French factory makes only a small number of the Dynas, while the German one has already turned out over a million VWs. The result is that the Dyna sells in France for the equivalent of $1900 – while the VW is much cheaper. This certainly proves that the Germans knew better how to organize their production, but from the standpoint of overall excellence of design the Gregoire product is in no way second to the Porsche masterpiece.

In both cases the advoidance of the superfluous was the guiding principle. The pay-off is reduced weight, with the resulting low gas consumption and comparatively good performance. These ideas might appear obvious, yet innumerable cars drag around thousands of pounds of unnecessary weight, using for that purpose hundreds of superfluous horses eating up gallons of wasted fuel. Neither the VW nor the Dyna Panhard are weighed down with such burdens which is why they are both among the most efficient vehicles ever built.

If such a car had been put on the market in 1948 by Kaiser, it might have caught on. After all, Volkswagens are selling in the U.S. at a rate of 60,000 a year and hoping to reach 100,000 or more – and the Kaiser-Gregoire would have been a much larger and more powerful car at about the same price.

The Gregoire Sport, of course, is not likely ever to be mass produced; the immediate plans of Gregoire call for the making of about a dozen of them in his small plant. They will not be cheap. If taken over by a manufacturer with larger facilities, the Gregoire Sport could probably be made to sell for the price of a Jaguar or a Mercedes 190 SL.

And there is always the chance that Gregoire may spring some new ideas on us, as he has done before. Comparable to Porsche in creative engineering ability, he has one important advantage over the German automotive genius – he is alive and a youthful 55. #

Alfa—Giulietta

(Continued from page 47)

in its current form the Giulietta's clutch is soft enough to be quite comparable with clutches that survive in American practice. You can let it out slowly while bringing the engine revs up gently, or you can let it out fast and use higher revs. Smooth first-gear starts can be made with engine speeds as low as about 1800 rpm.

The choice of transmission ratios is excellent, first being useful up to about 35 mph, second to 50 and third to 75. Torque is so ample that fourth is a perfectly acceptable gear for traffic but if you want to be aggressive, third will really get the job done. The gears emit a faint, pleasant whine.

But all is not perfection in the cog box. It is described as having "four forward synchromesh speeds" but there is no synchro on bottom gear. This is the first discovery and it's quickly followed by others. My test car was well broken in but the column-shift linkage remained stiff, much too stiff. Getting into second from first was often noisy. The long zig-zag shift from second to third sometimes failed – third was simply a closed door, so back to neutral and then back for another try to get in. On these repeat shifts the synchro would be inoperative, a fact announced by the noise of grinding gears. This also occurred during downshifts but could be avoided by double-clutching and speeding up the engine.

As far as our test car was concerned, some of these malfunctions must have occurred because the column-shift linkage was out of adjustment. Which, all by itself, is a sufficiently lethal indictment against the column shift. No manufacturer has ever built finer floor-shift transmissions than Alfa Romeo – Theirs are legendary. It's good to hear that the very latest Giulietta Sprint models *are* arriving in the U. S. equipped with floor shift.

STEERING

Giuliettas are fitted with ZF worm-and-roller steering. There are more expensive ways of building a steering mechanism but I've handled nothing, including worm-and-wheel, that is more perfectly precise. There is no lost motion in it and it's as quick and direct as a bicycle's steering. How this is accomplished with three turns of the wheel from lock to lock I'm not prepared to explain.

This steering has all the feel you could ask for or need, yet it's light. Little effort is required in parking and at 10, 40, or 80 mph you can hold the rim of the wheel between the tips of thumb and one finger and steer the car through a maze.

SUSPENSION

The Giulietta was first exhibited at the Turin Show of '54 and at that time its rear suspension was based on traditional quarter-elliptic springs. There may or may not be a connection between that fact and some early reports

(Continued on page 61)

from Italy criticizing these cars for body roll. At any rate, the rear suspensioh of the mass-produced Giuliettas is a very different matter. It consists of a solid axle with a vertical coil spring at each end. The coils enclose tubular shock absorbers and are mounted on vertical pillars that extend to the top of the unit-frame structure, just under the rear deck. No torque tube is used, but axle torque is controlled by a leading radius rod at each extremity of the axle. Large rubber pads are provided to keep the axle from striking the frame during extreme compression of the springs and straps are used to limit downward axle travel during rebound.

Lateral movement of the rear axle is controlled by a triangle of steel tubing, two corners of which are anchored to the frame-body structure while the third is attached to the final-drive housing by means of a ball joint. This housing, incidentally, is a jewel-like little structure of deeply-ribbed light alloy and it would do honor to a fine midget race car.

The front suspension is more orthodox and consists of long, unequal length wishbones and steeply inclined coil springs that enclose tubular shock absorbers. A safety cable, attached to each lower wishbone and to the frame, limits rebound travel of the front suspension.

The Giulietta's ride and roadholding qualities are additional Alfa achievements that can be described only in superlatives. In the corners it is absolutely glued, has the feel of a Ferrari or a Kurtis. I am not an exponent of the controlled slide and cannot evaluate the little Alfa in those terms, but in terms of a straightforward race car adhesion, this car has it. Also like a good race car, the body and frame do not oscillate softly above the suspension while cornering, as nearly all touring cars do. With the Giulietta, body, frame, and running gear all behave as one well-knit unit.

On the straightaway the car tracks dead-straight and true. On good pavement slight surface irregularities are felt distinctly. But on really foul, chuck-holed pavement or dirt, the worst bumps feel scarcely different. Many times I charged into deep ruts deliberately and was sure I had missed them because the reaction was so deceptively slight.

BRAKES

The Giulietta's brakes are just like those on the bigger, faster, costlier Alfa 1900 and are closely related to those developed on the Type 159 "Alfetta" Grand Prix cars. Here again,

(Continued on page 66)

Distinction

(Continued from page 19)

necessity on the Pacific Coast . . . Steering wheel mounted gear levers and new automatic transmissions must be offered. Also, bench front seats . . . British manufacturers similarly must soon offer on an increased scale wraparound wind screens, power-operated windows and hoods, tubeless tires, and air refrigeration."

The lamentable contradiction in the above statements will be obvious, and gives a clue to the philosophy behind the English car. Modifications for export use have greatly improved the durability, the shock absorbing, the sealing and the heating of British cars, and these are benefits which are pleasing on the home market as well. Less obvious is the necessity to alter styling to conform to overseas requirements. English design has long been edging in that direction, led bravely by the Rootes Group, whose new Sunbeam Rapier is a distillation of Studebaker and Nash Rambler contours. Standard Motors have not been far behind, finding similar inspiration in the Studebaker for their 1956 Vanguard III. Not surprisingly, the General Motors English subsidiary, Vauxhall, is another leader in the chrome and two-tone movement, and their latest product is almost indistinguishable from Willy's Motors' last efforts.

Many English sports cars, on the other hand, are refreshingly clean and original, but some of the latest designs, such as the MGA, seem to show the adoption of full-width bodywork for novelty's sake and not for its intrinsic qualities. The very best designs in England, as elsewhere, have resulted from competition and not commercial demands. Frazer-Nashes, the C and D Jaguars and the entire DB Aston-Martin series reflect this excellence of breeding.

Generally, British cars have long based their appeal on their special nature and distinction, realizing that the bulk of the American market is saturated with domestic production. Now, least of all, are they called upon to copy the American idiom in order to survive. The big four-door sedan is a native U.S. art form, and on a value-for-money basis is unsurpassed. Detroit can't be beaten at its own game; an axiom the foreign manufacturers have got to learn.

The Germans seem to have realized this, and to have taken advantage of it. At the bottom of the U.S. scale, great increases in the complexity and purchase cost of the domestic car have made room for a simplified form of transport, and the Germans appear to have anticipated this situation. Fast becoming a universal "peoples' car," the Volkswagen has derived worldwide success from clever basic design coupled with a basic keenness and thoroughness in production and service. Other small cars have met with limited success, but none have been so broadly befriended as the "unbustable VW."

At the opposite end of the range are the lush sports cars of Mercedes-Benz, who prepare their American ventures with as much care as their Grand Prix cars. One of the most astonishing and unlikely feats of the post-war scene has been the production and sale of over 1000 300 SLs, in a price level that other makers have been unable to exploit. We can be sure that production of Uhlenhaut's plaything would never even have been considered if the American market hadn't been present to absorb the bulk of the output. The same applies to the 190 SL, and it is notable that these two models have been pushed much harder in the U.S. than the Mercedes sedans, which encounter much more direct competition. This is not to say that Stuttgart is afraid of competition, but rather that they can perceive and pierce the holes in the U.S. market, an ability of much greater immediate value.

Imitation, as always, is the sincerest form of flattery, and it has been amusing to watch elements of 300 SL styling appear on Ferraris, Pegasos, and now finally on our own '56 Chevrolet Corvette. Teutonic automotive principles are now accepted the world over, thanks in part to extensive racing successes, and German products now maintain a high sale and resale level.

French and Italian builders have remained admirably faithful to their own countrymen, who drive cars hard under widely varying conditions. This produces rugged, responsive cars, well suited to broad export, but their makers do not relish the labor and detail work of establishing distant sales and service points. As a result of this alone they can expect to win no more than a fringe of the American market.

Ferrari, surprisingly, is a very U.S. conscious individual, and has even pro-

(Continued on page 65)

Fuel Injection

(Continued from page 15)

To see why, you have only to take a good look at the device that's been feeding our engines for the last sixty years. Engines breathe and burn a mixture of gasoline and air. They suck the mixture in, compress it, burn it, and spew it out, One and sometimes more carburetors sit in the path of an engine's insucked air stream and are designed so that the flow of incoming air past one or more jets drags a mist of fuel along with it.

Unless there's a separate carburetor bolted against each cylinder's intake port, the fuel-air mixture has some distance to travel before it reaches the various combustion chambers. It also has some corners to turn. When this happens, the heavy fuel particles tend to keep going straight ahead; raw fuel accumulates on the manifold walls and the charge that finally reaches the combustion chamber will be of irregular density and have irregular burning characteristics. One way to keep the fuel particles from falling out of the air stream is to be sure that the charge is thoroughly vaporized. So hotspots or water-jacket preheaters are provided on the manifold to heat the incoming mixture.These are fine from the point of view of regular density, but they have their disadvantages too. The heat causes the fuel-air charge to expand, and when it reaches the combustion chamber it is thinner, contains fewer calories to be transformed into power.

The intake manifold has other built-in bugs. For the engine to run smoothly, all the cylinders ought to receive the same amount of mixture and the same proportion of fuel to air. But the manifold delivers a bigger, richer charge to the cylinders closest to the carb, a leaner, smaller charge to those farthest from it — and in an in-line engine some of the cylinders are very far away indeed. Another self-defeating fact of manifolding is that the current of fuel-air mixture is constantly changing direction and this interferes generally with efficient breathing. Still another is the fact that in order to keep the current moving at a high velocity—essential for keeping the fuel particles from falling out of the airstream — the manifold has to have a small cross-section. But this constriction reduces the engine's efficiency as a pump, cuts down its breathing ability.

One of the most irritating of the carburetor's defects is its inherent inability to give you quick throttle response when you want it the most. When you want to accelerate quickly, you stand on the throttle. The larger opening permits atmospheric pressure to force more air into the engine instantly. But gasoline is much heavier than air; it has more inertia to be overcome. The air rushes past the fuel jet at higher speed, but it takes an appreciable moment — and often an inconvenient one for the driver — for the fuel to start flowing at the new rate. Similarly, when you decelerate the air shuts off instantly but the dynamic inertia of the heavier fuel keeps it flowing longer.

The automobile industry and its carburetor suppliers have coped valiantly with these and many other problems of the traditional induction system. They've developed ingenious intake manifolds, acceleration pumps, additional carburetor jets for various speed ranges, and the two-throat, four-throat and dual-four-throat setups. These have helped, but they've also increased manufacturing and operating costs. For this reason, FI is now not only preferable to carbs but also economically competitive. Five years ago FI was farther from mass production than the gas turbine. Now, thanks to the carburetion complexities spawned by the horsepower race, it's just as cheap to tool for FI and cash in on its impressive list of advantages.

With FI you can toss away that plumber's nightmare, the intake manifold. Even though today's manifolds will probably be used for economy's sake during the first few years of mass-produced FI, they will only carry air. Fuel particle "fall-out," hot spots, puddling, tiny cross-sections and their asthmatic effects — all these will be eliminated. Opposite each intake port in the air-manifold will be a threaded boss into which injector nozzles will be screwed. The nozzles will discharge directly against the intake valve. Eventually, as the cost of tooling is amortized and newly-designed top ends become feasible, still more FI benefits will become available. The future descendant of the intake manifold will be designed to harness the pulsations of the air column and probably get *more* than 100 percent filling of the cylinder! This technique has already been perfected, while its opposite is already in use in exhaust tuning.

Another, more immediate advantage of FI will be higher compression ratios. Engine designers, whose goal is the highest useful compression ratio because this is the one that gives the most power and fuel economy, have been hideously frustrated for decades by carburetor engines, where different fuel-air mixtures are delivered to each cylinder and the compression ratio is dictated by the worst-fed one. The only way to keep the starved cylinder from knocking is to feed it a mixture that is sufficiently rich. The other cylinders, which could get along nicely on a leaner diet, have to run wastefully over-rich. FI, on the other hand, gives each cylinder exactly the same fuel-air mixture. This permits the use of a higher compression ratio and also makes the engine less fussy about octane ratings.

FI helps engine breathing in many ways. For example, it does not require heat for "gasification" of the fuel and therefore delivers a denser charge. It also keeps the engine much cooler than carburetors can. When the velocity of the airstream is no longer important; the manifold and valve ports can be big enough to provide plenty of cool air. Neither air nor fuel vapor need to be heated. They enter the combustion chamber cool, and help to cool the parts of the engine that are inevitably the hottest—the combustion chambers and the exhaust valves. This is still another factor in lowering octane requirement.

With FI there is no fuel inertia as we have known it and consequently no throttle lag when you accelerate. Fuel goes to the engine in instant response to load requirement rather than in response to the flow of air past a carburetor jet. When you hit the throttle air rushes into the cylinders and the injectors force finely-atomized fuel into them in just the right, uniform amounts to give a consistent ratio of fuel to air and in a consistent distribution pattern throughout all the engine-speed ranges, economical metering of fuel, far greater elasticity of engine response to the controls. The Mercedes 300 SL, for example, can accelerate with perfect smoothness from 15 to 160 mph in top gear. Carbureted engines, with their meandering manifolds and the varying turbulence and velocity that changing positions of the throttle plate cause, can't begin to match this kind of performance. #

Torrey Pines

(Continued from page 49)

was still Woods' D-Jaguar, but Hill was now only three seconds behind.

Apparently this blistering challenge was too much for the 2-litre engine in the veteran Ferrari and some twenty minutes later, while trailing by sixteen seconds, it literally flew apart, tearing a fist-size hole in the block.

After Hill's retirement, there was no opposition to the D-Jaguars as Woods held an easily maintained lead over Johnston, who had taken over Austin's mount. Minutes after the half way mark, however, Woods' D-Jaguar blew its bearings and Johnston inherited a lead that he held handily for the remaining three hours, finishing over three laps ahead of second place Jack McAfee's Porsche Spyder and four-and-a-half laps ahead of Jean Kunstle's third place Porsche Spyder.

Ak Miller, who gained international recognition by finishing his hot-rod fifth against the best the sports car world had to offer in the 1954 Mexican Road Race, teamed with Jim Wilcox to bring a Mercedes 300SL in fourth. Although apparently experiencing difficulty in handling the car at first, Miller was extremely impressed by the end of the day and was particularly high in his praise of the brakes. If arrangements can be made, he plans on installing them in the Chrysler-powered Kurtis he is preparing for the next Mexican Road Race.

The Index of Performance Award went to Francois Crouzet, for the second consecutive time, in a DB Panhard Le Mans. Ernie McAfee, touted as Crouzet's logical challenger on the basis of his win during the first six-hour race, was forced out when a cracked hub on his Moretti caused him to lose a wheel. Oddly, it was evidently obvious to everyone but the people in his pits that he was going to lose the wheel several laps before it finally broke loose.

Sunday started with another disappointment for the assembled crowd, many of whom had come expecting to see visiting Stirling Moss, the world's number two driver, indulge in a vigorous practice session against such American drivers as Hill and Johnston after the FIA refused to give him permission to race in a non-sanctioned event. But Moss showed up late, prowled through the pits and finally did a few laps in an Austin-Healey. Even this failed to pacify much of the crowd, since his presence on the track wasn't announced until about two laps before he pulled off.

Moss, incidentally, inadvertently included a visit to the local jail as part of his tour of Southern California after he tried playing Stirling Moss on the streets of nearby La Jolla before an audience of unappreciative police officers. Not realizing that signing a citation is standard practice in California, Moss crisply refused to do so and was promptly escorted to police headquarters. And there he sat until someone at the track got word and sent race coordinator Al Papp down with bail.

When the races finally got under way, the production class winners followed the patterns set in recent meets. Jean Kunstle powered a Porsche Speedster home ahead in the Under 15 cc Production race and Rudy Cleye's Mercedes 300 SL nabbed the award for large production cars after Bruce Kessler, also in a Mercedes, was disqualified for removing his helmet during the cool-off lap.

In the going for modified cars under 15 cc, Ken Miles, who recently joined Johnny von Neumann's Porsche combine, racked up another in his long series of victories despite early pressure from Pete Lovely in his Porsche-Cooper. Actually, the fact that Miles competed at all was something of a minor miracle after he sent a Porsche Spyder flipping end over end during Saturday's practice. But the unscathed Miles, whose nonchalance is virtually legendary, just surveyed the wreckage in the pits, grinned, observed that it "Looks like I bent a wheel" and strolled off to line up another mount.

The battling for laurels in the over 1500 cc modified race turned out to be no battle at all, a combination of mechanical difficulties and driving errors handing top spot to Gregory's Maserati.

Ernie McAfee blasted his Ferrari Monza into the lead, but a costly bit of misjudgement on turn two sent him spinning into the hay bales about 20 seconds later. Hill, at the wheel of another Ferrari Monza, then moved into first. For seven laps he consistently stretched his lead before a boiling radiator forced him into the pits for the day. Gregory then held down first with Johnston second. Within four laps, Bill Murphy's Kurtis-Buick, the only American car conceded a chance against the imported machinery, had bulled its way into third, followed by McAfee, who had moved up from 17th spot. On the next lap, Murphy got around Johnston and McAfee whipped the Ferrari past both the Kurtis-Buick and the D-Jag, which was experiencing mechanical difficulties that cut off its power coming out of the turns.

For the next nine laps, the only change in top positions came when Miles whistled his tiny Porsche past Chuck Daigh in the Troutman-Barnes (Mercury) Special and began nipping at the tail of Johnston's Jag. On the 21st lap, Miles' overjoyed pit crew jokingly put up the sign "Pass D-Jag." The next time around, Miles was in fourth spot.

By then it was obvious that McAfee's brilliant driving effort wasn't quite brilliant enough to overcome Gregory's advantage before time ran out. When the Kurtis-Buick spun on turn six, Miles moved the Porsche into third spot and the story was told: Gregory 50 seconds ahead of McAfee and Miles about a minute further back.

The Kurtis-Buick's revolving exit from contention delivered a sharp blow to the hopes of boosters of American built products, particularly after its failure to finish on Saturday. The spin was the culmination of a string of earlier difficulties climaxed by a trip into the hay during Saturday's practice and Sunday's trophy-losing spin.

Despite the D-Jaguar's win in the endurance race, which made it three in a row for Coventry products, and a gallant effort before mechanical troubles set in on Sunday, many spectators expressed disappointment with the performance of the English racers. Lap times, however, indicate that it was running well.

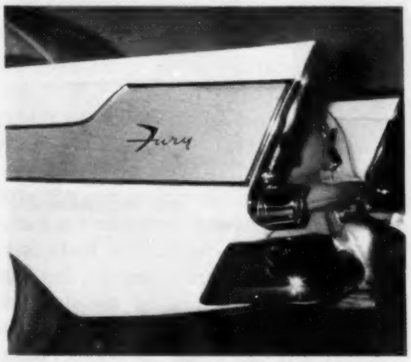
As the meet ended, the rumor shot through the pits that further delays in converting the Torrey Pines area into a golf course would permit the running of still another event. But city officials killed the story with a statement asserting that work would begin in early spring. Probable basis for the rumor was the action of Junion Chamber of Commerce representatives, who discussed a possible course in San Diego's Balboa Park with several officials, top drivers and press representatives. In short, this *was* the last Torrey Pines race — we think. #

Fury

(Continued from page 11)

A top speed run was impossible due to the weather but at least one Fury has cranked up a two way average of 124.01 mph through the NASCAR traps at Daytona Beach. Phil Walters turned 124.611 on a southbound run and 123.440 on the return run to make up the average. The car I drove had been driven only the day before at 115 mph (speedometer indication) by one of the plant engineers who insisted the car was nowhere near flattened out at that speed. This compares more than a little favorably with the flat-out 97 cranked up by a stock Plymouth hardtop in a road test I had participated earlier. The 0 to 60 time turned up in the wet was a full three seconds faster than the time turned in by the stock machine run on dry pavement.

There are reasons for all this fire as well as for the excellent handling characteristics of the Fury. The Fury



engine is, at 303 cubic inches displacement, bigger by 26 cubic inches than the engine used in the Belvedere. Power developed is 240 bhp at 4800 rpm as against 187 bhp at 4400 rpm for the standard engine. The latter, equipped with Power Pak, is still 40 horses short of the output of the Fury.

Actually the Fury engine is a hot rod in every sense of the word when compared to the standard item. It has been bored to 3.8125 and stroked to 3.3125 inches. It has been given a 9.25 to 1 compression ratio (as compared to the 8 to 1 CR of the Belvedere), a bigger quad-throat carburetor, a definitely different valve timing and a larger dual exhaust system. In addition, the engines are put together separately from the rest of the production line and fitted by selective assembly. This means that, although such things as valves, valve springs and pushrods are stock units, they aren't just hauled

(Continued on page 66)

Distinction

(Continued from page 62)

duced models specifically for this country. The 4.1 litre "America" will be recalled, and a 5 litre "Super America" is now available. Also, when initial production of the D Jaguar was slow, impatient and well-heeled buyers turned to the versatile 3 litre "Monza" Ferrari.

An attempt to bolster sagging sales, the Lancia "Spyder" on the Aurelia chassis was aimed directly at American dollars. The Pinin Farina body was strongly reminiscent of the older Corvette, apparently on the supposition that G.M. could do no wrong. It is easy these days for the small continental shops to keep pace with the active and enthusiastic Detroit stylists, and they are now stressing radical and "off-beat" designs, instead of the old pure, taut line.

The English reached the American market first, and have been here long enough to warrant a step back and a pause to survey their position with regard to both the U.S. and their European competitors. Teutonic enterprise shows no signs of slackening pace, while other continentals continue to supply very specialized markets. A very shrewd balance of resources is necessary to do well in the expansive American economy, and, contrary to the impressions of many Europeans, a good product is necessary to back up heavy advertising.

Numerous examples have shown that if a car has a sincere purpose in life backed by intelligent design and manufacture, it will sell itself well without imitative styling or ostentation. The threat from within is strong, but a cool-headed reply could meet and better it. #

Fury

(Continued from page65)

out of a bin and stuffed into the engine but pulled out and carefully matched in all respects. Springs are matched for open and closed pressure, pushrods are matched for weight and straightness and valves are matched both for size and weight. Not that all engines are not fairly closely matched but in selective assembly differential tolerances are at a minimum or non-existent insofar as it is possible to come that close.

The chassis, too, has gotten a face-lifting. Although the frame is similar to the standard unit, suspension units and brakes are vastly different. Brake area is 173.5 square inches with 11.5 by 2 inch shoes both front and rear. Spring rates are much higher, accounting for the firmer ride and good cornering characteristics. The shock absorbers are Chrysler production Oriflows but are heavier than the standard units and with different valving to produce the remarkable stiffening effect mentioned earlier.

Insofar as styling goes, the Fury is outwardly quite similar to the more ultra models of the standard production series cars except for the use of gold trim in place of the more usual stainless steel and chrome. The interior is a bit more restrained with a generous use of tan leather, spiked with gold embossed fabric. All seats are foam rubber based, an extra-cost option on other models. As far as that goes, the only extra-cost items on the car are Powerflite transmission, radio and power brakes so the "stripped" version is hardly stark. Even the 6000 rpm tachometer is standard equipment as are wing mirrors, turn signals and variable speed windshield wipers.

From all outward appearances, Plymouth has come up with a car that should do well in the power race and in stock car competition as well, even on such tracks as the tortuous Willow Springs, California, road course. In the process they have come up with a family bomb that performs more like a sports car than many so-called sports type coupes loudly touted as being "sports cars." With an FOB, Detroit, price of $2800, here is a fairly sporting machine that will draw no static from the most conservative wife. Except for the previously mentioned slow steering and standard styling it should even please the purist. #

Alfa—Giulietta

(Continued from page 60)

and here above all, mere superlatives are not enough. Look at it this way. The Mercedes-Benz 300 SL has magnificent brakes. It has 257 sq. ins. of friction area for its 2240 lbs. of dry weight. The Giulietta is claimed to have 264 sq. ins. for its 1800 lbs. of dry weight. In terms of brake lining area per ton, this gives the little Alfa 293 sq. ins. against the 300 SL's 230! You can be sure that the performance of these brakes is not easily forgotten.

The front brake drums are huge light alloy castings containing ferrous liners and having deeply machined diagonal ribs which serve as air-pumping vanes and increase the heat-dissipating surface. The rear drums have conventional circumferential ribs and are of similar bimetallic construction.

I have never experienced brakes of such superb quality. The Giulietta's stopping distances are fractions of those of Detroit cars and of many sports cars. In spite of this immense deceleration the car's occupants are not flung forward nor does the car nose down. You can perform braking feats with ease in the little Alfa that would be desperately reckless in another car. It stops in a straight line. You do not have to churn wildly at the steering wheel in an effort to keep the car on the pavement during emergency type stops. Finally, the brakes are inexhaustibly fade proof. And beyond that, the transmission ratios are so chosen that you can always find just the right gear for steep mountain descents and hardly need to touch the brakes at all.

BODYWORK

The low-priced Berlina has a mass-production body with lines that are pleasing but not breathtaking. Seats are of the bench type and provide comfortable accommodation for four passengers. Interior appointments, including instruments, are confined to the austere necessities.

The medium-priced Spyder (a name once used for wiry, light-weight carriages) has a beautifully contoured body by Pinin Farina. The appointments are *de luxe* throughout for it and the Coupe. Instruments include a large rev counter immediately over the steering column, a metric speedometer, gauges for water and oil temperature, oil pressure, fuel capacity, and a bevy of warning lights. Bucket seats with folding backs give excellent lateral support and there is ample head and leg room for occupants six feet tall.

The convertible top has the advantage of folding completely out of sight behind the seat backs. But unlike the rest of the coachwork, this top deserves a good deal of criticism. Its metal framework is heavily spring-loaded and stowing the top can be an annoying job for two persons. There is no positive locking device to hold the stowed top in place against its eager springs and it occasionally tries to unfurl itself, which results in grinding the top fabric against the seat backs. The top has no headliner, rattles like a snare drum in a strong wind and is insecurely fastened to the rear deck.

Actually, these are minor defects that can be corrected by the lucky owner for a very few dollars and it's to be expected that a firm with Alfa's high standards will be quick to check them at their source.

The Coupe I had hopes of testing was sold after I had fondled it for less than 15 minutes. I had seen photos of the car many times before but not until I was in its physical presence was I able to appreciate it fully. The body is by Bertone and it's my own feeling that of all the thousands of unusual and beautiful postwar Italian bodies, hardly any can equal its simple, sculptured beauty.

The Coupe's visibility is splendid. Its interior appointments are comparable with the Spyder's, and it is relatively spacious. The area behind the front bucket seats can be used for great stacks of luggage, for seating children on long trips or for adults on an "occasional" basis. But *the* virtue of the Coupe is its exquisite style.

A car that's a treasured collector's item today is the 1.5 liter, four-barrel Brescia Bugatti. It sold new in the early Twenties for about $2500. Another hand-built treasure was the 1.5 liter Alfa of the late Twenties which sold for around $5000. Times have changed and small-scale volume production has penetrated to the pure-bred field. The Giulietta is today's improved equivalent of the baby Bugs and Alfas and it's to be had for a range of prices from $2700 to $4200. It's a legitimate jewel, bargain-priced for those who recognize its worth. #

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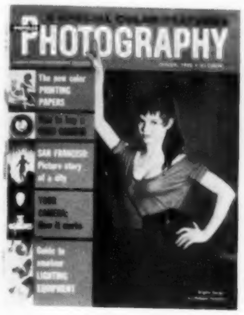

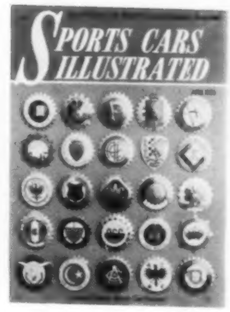

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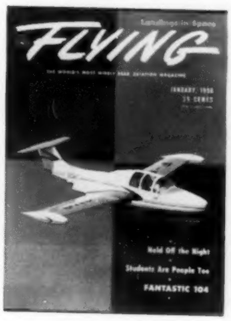

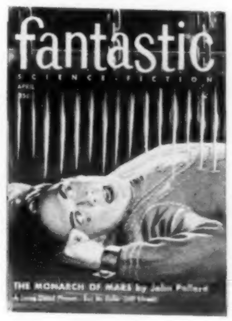

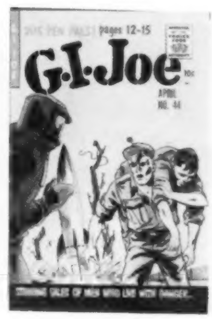

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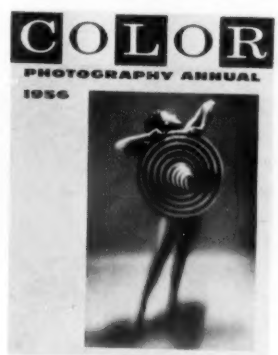

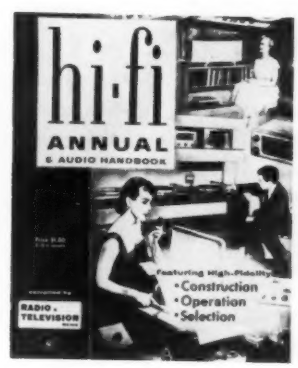

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